



NORTH DAKOTA
STATE UNIVERSITY

2021/2022
**UNDERGRADUATE AND
GRADUATE BULLETIN**

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About the Bulletin

The **University Bulletin** is the official undergraduate and graduate catalog that includes information about academic programs and student services offered by North Dakota State University. It contains general University and undergraduate and graduate academic policies and degree requirements. This bulletin (or catalog) is published online only. The bulletin is intended to complement other university information including specific materials supplied by schools, colleges, departments, and programs.

- The information in the Undergraduate Bulletin (<http://bulletin.ndsu.edu/undergraduate/>) applies to all undergraduate and professional students at the university. Some academic policies also apply to graduate students. Additional information for graduate students is available in the Graduate Bulletin (p. 733). Information in the individual college sections applies to students enrolled in those specific degree programs of study.
- The academic policies and information contained within this bulletin are effective for the **2020-2021 academic year**, beginning on August 24, 2020 and ending on August 6, 2021.
- The undergraduate curricula within the bulletin are effective for students who entered NDSU or who declared a program of study during the **2020-2021 academic year**. Continuing and returning students follow the curriculum in place at the time their program of study was officially declared with the University.
- Questions about undergraduate academic policies and curriculum guides may be directed to the Office of Registration and Records. Questions about graduate programs and policies can be directed to the Graduate College.
- It is important for students to be familiar with all the information that applies to them, including policies and procedures related to registration, academic progress and degree requirements. Students are strongly encouraged, and may be required by the department to consult their advisers at least once each semester to ensure they are completing requirements applicable to their degree and major programs.
- All new, current and returning students should become well acquainted with the regulations regarding student academic (<https://www.ndsu.edu/fileadmin/policy/335.pdf>) and behavioral (<https://www.ndsu.edu/fileadmin/policy/601.pdf>) codes of conduct.
- Information about the Family Educational Rights and Privacy Act of 1974 (<https://www.ndsu.edu/registrar/records/ferpa/>), as amended, is available online or in the Office of Registration and Records.

State Board of Higher Education Policy - Section 450

In accordance with State Board of Higher Education policy, Section 450: Institutional Reports, Catalogs, Bulletins: "Institutions shall publish electronic and/or hard copies of catalogs and bulletins for the purpose of furnishing prospective students and other interested persons with information about the institutions. Announcements contained in such printed or electronic material are subject to change without notice, and may not be regarded in the nature of binding obligations on the institutions and the State."

Reservation of Rights

Every effort has been made to provide accurate and current information; however, the right is reserved to change any of the rules and regulations of the university at any time, including those relating to admission, instruction, and graduation. The right to withdraw curricula and specific courses, change or discontinue programs, alter course content, change the calendar, and to impose or increase tuition and fees similarly is reserved. In some cases, requirements for programs and prerequisites for courses offered are effective even if they are not listed in this bulletin. All such changes are effective at such times as the proper authorities determine, and may apply not only to prospective students but also to those who already are enrolled in the university.

Non-discrimination Policy

North Dakota State University does not discriminate on the basis of age, color, disability, expression/identity, gender, genetic information, marital status, national origin, public assistance status, race, religion, sex, sexual orientation, or status as a U.S. veteran. Direct inquiries to the Office of the Vice Provost and Title IX Coordinator (<https://www.ndsu.edu/equity/>), Old Main 201, (701) 231-7708.

Message from the President

North Dakota State University is a truly amazing place, a model for others in higher education to emulate. Our proud university is a shining example of a successful student-focused, land-grant, research institution—and that means NDSU commands a powerful niche.

The rest of the country and the world are noticing our accomplishments.

NDSU is listed at 95 among 404 public universities based on the university's research expenditures reported to the National Science Foundation. In addition, NDSU is listed in the National Science Foundation's top 100 in several areas, including: agricultural sciences; business management and business; communications; materials science; natural resources and conservation science; social sciences; sociology, demography, and population studies; and visual and performing arts.

NDSU has more than 12,000 students in our undergraduate and graduate programs. We have more than 2,000 graduate and professional students. NDSU student-athletes compete and succeed in the ranks of NCAA Division I.

The level of interest in the university has risen dramatically among students, the public and colleagues around the globe. This institution has evolved and progressed—we have increased our productivity, visibility and contributions to a greater number of constituencies.

We have a strong sense of community and campus pride at NDSU. We are dedicated to the land-grant mission of quality education, leading research and outstanding service. NDSU clearly makes a difference in the lives of students and the vitality of our community, state, region and nation.

The future of the great state of North Dakota is at a point of awakening—and our imagination is the only limit to the future. We at NDSU are poised to help make that future a reality.

I urge you to use this catalog to explore the many educational opportunities offered by our university. Join us as NDSU moves forward. The best is yet to come.

Dean L. Bresciani
President

NDSU Overview

Mission

With energy and momentum, North Dakota State University addresses the needs and aspirations of people in a changing world by building on our land-grant foundation.

Vision

We envision a vibrant university that will be globally identified as a contemporary metropolitan land-grant institution.

Core Values

NDSU is guided by the following key values and principles:

Land-grant

- We reflect and serve geographically and culturally diverse populations.
- We share institutional success across the university.
- We anticipate and welcome growth and service that will occur in ways yet to be conceived.
- We embrace our unique complexities as a land-grant university on the Northern Great Plains.
- We remain committed to serving people globally.

People

- We derive strength and vitality from each other and from the diverse communities we serve.
- We envision an academic and social environment that is conducive to intellectual and personal development by promoting the safety and welfare of all members of the university community.
- We promote excellence through individuals participating in decisions and value cooperation for the common good.

Scholarship

- We are an engaged university and acknowledge and pursue scholarship of all forms, including discovery, teaching, integration, and application.
- We uphold the rights and responsibilities of academic freedom.

Teaching and Learning

- We provide a superior teaching and learning environment within and outside of the traditional classroom.
- We promote and value liberal, graduate, and professional education in a collegial environment where divergent ideas can be shared.
- We foster an environment that promotes life-long learning with individually-defined goals.

Ethics

- We maintain our integrity through principled action and ethical decision-making.

Culture

- We will be the land-grant university that we want to be by welcoming and respecting differences in people and ideas.
- We support the goals of the North Dakota University System and value collaboration with colleges and universities around the world.
- We foster accessibility to our programs and services.

Accountability

- We have a special relationship with, and are accountable to, the people of North Dakota.
- We actively strive to contribute to our region's economic prosperity and to improve the quality of life.

A Vibrant Educational and Research Environment

NDSU is a highly regarded and often recognized student-focused, land-grant, research institution. With a land-grant mission to provide quality education, leading-edge research and excellent service, NDSU is acknowledged as a national leader among its peers, and seen by many as a model for success.

NDSU is listed at 95 among 404 public universities based on the university's research expenditures reported to the National Science Foundation. In addition, NDSU is listed in the National Science Foundation's top 100 in several areas, including: agricultural sciences; business management and business; communications; materials science; natural resources and conservation science; social sciences; sociology, demography, and population studies; and visual and performing arts.

NDSU has enjoyed consistent growth with more than 12,000 students in its undergraduate and graduate programs. Annual research expenditures at the university surpass \$150 million.

NDSU's Research and Technology Park is an award-winning example of success. Located on the northwest portion of campus, it is a place where university researchers, students and private industry combine talents to develop and commercialize new technologies, methods and systems.

Founded in 1999, the research park is host to nationally known companies John Deere Electronic Solutions and Appareo. The Park has a 50,000 square foot Incubator building that accelerates the success of startup companies. Successful Incubator graduates include Harvest Profit, Intelligent InSites, Pedigree Technologies and Myriad Mobile.

New to the Incubator and opening soon is the NDSU Innovation Studio. The Innovation Studio is a makerspace that will include equipment for metal fabrication, digital fabrication, woodworking, textiles and electronics.

NDSU President Dean L. Bresciani describes the university as a place where students can succeed academically and personally through learning, involvement, service and leadership. "NDSU is unique nationally in that it is a land-grant, research-based and student-focused university," he said. "That combination provides what few others institutions do, and our students are realizing the benefits."

A Historical Perspective of NDSU

A Bit of History

North Dakota had been a state less than a year when Governor John Miller signed a bill on March 8, 1890, designating a square mile of land adjoining Fargo as the site of the new campus and demonstration farm under the name North Dakota Agricultural College and Agricultural Experiment Station.

With President Horace E. Stockbridge and five faculty members, the university opened for its first collegiate year on September 8, 1891. A total of 30 students were listed in the 1891 Prospectus as being "matriculated in the Special Course."

Through its proud history, the campus has gained a strong reputation for outstanding education, research and service. An engaged university, NDSU is recognized as a leader among its peers. Acknowledged nationally, NDSU is among 108 institutions listed in the "Research University/Very High Research" category by the Carnegie Commission on Higher Education.

The Land-Grant Heritage

Honoring the commitment of the Morrill Act of 1862, the land-grant universities were established to provide studies that were a blend of technical and academic subjects. Known as a "people's college," NDSU was part of the bold experiment to provide access to a college education for the common person.

NDSU, the state's first land-grant institution, is well positioned to prepare graduates for the global marketplace and technologically oriented economy. Through a statewide network of centers and electronic technology, NDSU provides a growing capability for delivering education, cultural activities and information to schools and homes throughout North Dakota. NDSU is a publicly supported comprehensive land-grant institution, with a strong agriculture and applied science tradition.

The College of Graduate and Interdisciplinary Studies

Graduate students were first accepted in 1895, and a formal announcement of graduate studies has been carried in the bulletins since 1902.

The Graduate College was formalized July 1, 1954, by approval of the North Dakota Board of Higher Education. Graduate studies were administered by a Graduate Council from November 1949 to June 1954, and before that by a Graduate Committee.

The first Master of Science degree was awarded in 1899. Since then, graduate students have been in regular attendance and have participated in the scholarly activity of the campus. The number of degrees awarded increased noticeably after 1920 and again after 1950 in reflection of general trends in higher education in the United States.

In 1959, the North Dakota Board of Higher Education first authorized certain departments to offer the Doctor of Philosophy degree. The first Ph.D. degrees were awarded in 1963.

NDSU Today

NDSU has experienced a remarkable period of growth and expanded academic opportunities, and it is recognized as a national model of the contemporary land-grant institution. NDSU has more than 12,000 students in its undergraduate and graduate programs, and its research expenditures surpass \$150 million annually.

NDSU is listed at 95 among 404 public universities based on the university's research expenditures reported to the National Science Foundation. In addition, NDSU is listed in the National Science Foundation's top 100 in several areas, including: agricultural sciences; business management and business; communications; materials science; natural resources and conservation science; social sciences; sociology, demography, and population studies; and visual and performing arts.

An institution committed to progress, NDSU continues to advance in all areas because of the energy and dedication of faculty, staff, students, alumni, and friends.

NDSU Today

Academic Programs

NDSU offers approximately 110 undergraduate and approximately 140 graduate degree programs of study in eight academic colleges. Degrees are awarded at the doctoral, master's, professional, and baccalaureate levels. Various undergraduate minors and certificate programs at the undergraduate and graduate levels also are available. Programs offered at the time of this publication are listed in the Programs of Study (<http://bulletin.ndsu.edu/programs-study/>) section of this bulletin or may be viewed online at www.ndsu.edu/majors (<https://www.ndsu.edu/majors/>).

The Faculty

As of Fall 2020, NDSU has 653 full-time faculty, lecturers, and program administrators, as well as 116 part-time faculty and academic staff within Academic Affairs. Because of the nature of a land-grant university, many faculty hold joint appointments with affiliated research organizations on the campus.

Divisions

- Office of the Provost (<https://www.ndsu.edu/provost/>)
- Division of Agricultural Affairs (<https://www.ndsu.edu/vpag/>)
- Division of Finance and Administration (<https://www.ndsu.edu/vpfa/>)
- Division of Information Technology (<https://www.ndsu.edu/vpit/>)
- Division of Research and Creative Activity (<https://www.ndsu.edu/research/>)
- Division of University Relations (<https://www.ndsu.edu/vpur/>)

The Campus

The NDSU campus in Fargo includes more than 97 buildings on approximately 44 square blocks or 261 acres. Statewide, NDSU is located on 19,869.39 acres of North Dakota land, which includes the main Agricultural Experiment Station in Fargo and seven research centers throughout the state. With NDSU's campus growth into downtown Fargo, that area has been transformed structurally, strategically and socially with its presence there, invigorating both the university and the downtown community.

The Fargo-Moorhead Community

The home of NDSU, Fargo is a bustling metropolitan area that is often listed as one of the best places to live in the country. Fargo is quietly earning a reputation as a perfect place to make a home. Nestled in the rich farmlands of the Red River Valley, the Fargo-Moorhead community has many qualities that contribute to this reputation, including a highly respected educational system; advanced medical technology; a progressive business community; numerous cultural and arts opportunities; clean air and water; and good-hearted, friendly people.

Fargo-Moorhead is among the largest metropolitan centers between Minneapolis and Seattle. More than 245,000 people make their home in Cass and Clay Counties. One of the reasons people choose NDSU as a place to get a good education is that the F-M community provides students access to part-time jobs, internships, parks and other recreational facilities, entertainment, and cultural amenities.

Continuing Education

Continuing Education is an outreach unit of the university that makes the resources of the institution available in a variety of ways, including K-12 professional development classes (EDUC 2000), continuing education units (CEUs), youth programming, and community education. Courses, locations, and delivery systems are planned in response to requests and identified needs. Continuing Education is housed within the Office of Teaching and Learning.

University Resources

- Alumni Association (<https://www.ndsualumni.com/>)
- Centers and Institutes (https://www.ndsu.edu/research/about_rca/ndsu_centers_and_institutes/)
- Extension Service (<http://www.ag.ndsu.edu/extension/>)
- Facilities Management (<https://www.ndsu.edu/facilities/>)
- Information Technology Services (<https://www.ndsu.edu/its/>)
- Institutional Research and Analysis (<https://www.ndsu.edu/oira/>)
- NDSU Libraries (<http://www.ndsu.edu/library/>)
- NDSU Research and Technology Park (<http://www.ndsuresearchpark.com/>)
- Research Extension Centers (<http://www.ag.ndsu.edu/research/research-extension-centers/>)

NDSU Policy Manual

NDSU, the North Dakota University System, and the State Board of Higher Education have numerous policies and procedures that apply to students, faculty, and staff. The NDSU Policy Manual (<https://www.ndsu.edu/policy/>) is available online and includes, among others, the following policies that pertain to students:

- Anti-Harassment Policy (<https://www.ndsu.edu/fileadmin/policy/163.pdf>)
- Campus Security (https://www.ndsu.edu/police_safety/police/annualsecurityreport/)
- Email Policy (<https://www.ndsu.edu/fileadmin/policy/609.pdf>)
- Equal Opportunity and Non Discrimination Policy (<https://www.ndsu.edu/fileadmin/policy/100.pdf>)
- Privacy of Student Records (<https://www.ndsu.edu/registrar/records/ferpa/>)
- Sexual and Gender-Based Harassment, Sexual Misconduct, and Title IX Policy (<https://www.ndsu.edu/fileadmin/policy/162.pdf>)
- Sexual Misconduct and Title IX Compliance (<https://www.ndsu.edu/fileadmin/policy/603.pdf>)
- Use of Alcohol and Other Drugs (<https://www.ndsu.edu/fileadmin/policy/155.pdf>)

Administration

- **Dean L. Bresciani, Ph.D., President**
 - Christopher S. Wilson, J.D., Chief of Staff
 - Matthew Larsen, Director of Athletics
 - Tom Claeys, State Forester
- **Margaret Fitzgerald, Ph.D., Provost**
 - David Bertolini, Ph.D., Dean of the College of Arts, Humanities and Social Sciences
 - Scott Beaulier, Ph.D., Dean of the College of Business
 - David Buchanan, Ph.D., Associate Dean of the College of Agriculture, Food Systems, and Natural Resources
 - Benton Duncan, Ph.D., Interim Dean of the College of Science and Mathematics
 - Margaret Fitzgerald, Ph.D., Interim Provost and Dean of the College of Human Sciences and Education
 - Michael R. Kessler, Ph.D., Dean of the College of Engineering
 - Joe Mocnik, Ph.D., Dean of Libraries
 - Charles D. Peterson, Pharm.D., Dean of the College of Health Professions
 - Claudia Tomany, Ph.D., Dean of the College of Graduate and Interdisciplinary Studies
- **Greg Lardy, Ph.D., Vice President for Agricultural Affairs**, Director of the N.D. Agricultural Experiment Station
- **Bruce A. Bollinger, Vice President for Finance and Administration**
- **Marc Wallman, Vice President for Information Technology**
- **Jane Schuh, Ph.D., Vice President for Research and Creative Activity**
- **Laura McDaniel, M.S., Associate Vice President for University Relations**

Accreditation

NDSU is accredited as an institution by the Higher Learning Commission (<https://www.hlcommission.org/>) and inquiries may be directed to them at 230 South LaSalle St., Suite 7-500, Chicago, IL 60604-1411. In addition, many programs are accredited or approved by their respective professional organizations and agencies.

Accrediting Agency Degrees and Programs

The following programs of study are accredited as listed below and in the college sections of this bulletin:

- Accreditation Commission for Programs in Hospitality Administration: Hospitality and Tourism Management (Bachelor of Arts and Bachelor of Science)
- Accreditation Council for Pharmacy Education (ACPE): Pharmacy Doctorate
- Accrediting Council for Education in Nutrition and Dietetics: Dietitian Education Program (Bachelor of Science); Didactic Program in Dietetics (Bachelor of Arts and Bachelor of Science)
- American Council for Construction Education: Construction Management
- American Society of Health-System Pharmacists: Pharmacy (Doctor of Pharmacy)¹
- American Veterinary Medical Association Committee on Veterinary Technician Education and Activities (AVMA): Veterinary Technology (Bachelor of Science)
- Association to Advance Collegiate Schools of Business: Business (Bachelor Science and Master of Business Administration)
- Certified Financial Planner Board of Standards: Family Financial Planning (Master of Science and Graduate Certificate)
- Commission on Accreditation for Respiratory Care: Respiratory Care (Bachelor of Science)
- Commission on Accreditation of Allied Health Education Programs: Exercise Science (Bachelor or Arts and Bachelor of Science)
- Commission on Accreditation of Athletic Training Education (CAATE): Athletic Training (Master of Athletic Training)
- Commission on Collegiate Nursing Education (CCNE): Bachelor of Science in Nursing; Master of Science in Nursing; Doctor of Nursing Practice
- Council for Interior Design Accreditation: Interior Design (Bachelor of Arts and Bachelor of Science)
- Council on Education for Public Health (CEPH): Public Health (Master of Science)
- Engineering Accreditation Commission of ABET, <http://www.abet.org>: Bachelor of Science degrees in: Agricultural and Biosystems Engineering, Civil Engineering, Computer Engineering, Construction Engineering, Electrical Engineering, Industrial Engineering and Management, Manufacturing Engineering, Mechanical Engineering
- Institute of Food Technologists: Food Science (Bachelor of Science)
- Joint Review Committee for Education in Radiologic Technology: Radiologic Sciences (Bachelor of Science)²
- Landscape Architecture Accreditation Board: Bachelor of Landscape Architecture
- National Accrediting Agency for Clinical Laboratory Science: Medical Laboratory Science (Bachelor of Science)³
- National Architectural Accrediting Board: Bachelor of Science in Architecture and Master of Architecture
- National Association for the Education of Young Children: Center for Child Development
- National Association of Schools of Art and Design: Visual Arts (Bachelor of Fine Arts, Bachelor of Arts and Bachelor of Science) and Interior Design (Bachelor of Arts and Bachelor of Science)
- National Association of Schools of Music: Music (Bachelor of Arts, Bachelor of Science, Bachelor of Music, Master of Music, Master of Music in Music Education, Doctor of Musical Arts)
- National Association of Schools of Theatre: Theatre (Bachelor of Fine Arts, Bachelor of Arts and Bachelor of Science)
- National Council for Accreditation of Teacher Education (NCATE): Teacher Education (Bachelor of Arts, Bachelor of Science, Master of Education and Master of Science); Education Administration (Master of Education and Master of Science); Counselor Education (Master of Education and Master of Science)
- National Council for Accreditation of Counseling and Related: School and Clinical Mental Health (Master of Education and Master of Science); Counselor Education and Supervision (Doctor of Philosophy)

¹ NDSU affiliates with 5 ASHP accredited programs that hold primary responsibility for accreditation.

² NDSU affiliates with 10 JRCERT accredited hospital-based programs that hold primary responsibility for accreditation.

³ NDSU affiliates with 6 NAACLS accredited hospital-based programs that hold primary responsibility for accreditation.

Officers of Agencies Associated with the University

- Lynette Flage, Ph.D., Associate Director, NDSU Extension (<https://www.ag.ndsu.edu/extension/directory/>)
- John Glover, President and CEO, NDSU Foundation and Alumni Association (<https://www.ndsufoundation.com/>)
- Stacy Duffield, Ph.D., Director, Office of Teaching and Learning (<https://www.ndsu.edu/otl/>)
- Tom Claeys, State Forester, North Dakota Forest Service (<https://www.ag.ndsu.edu/ndfs/>)
- Mark Jirik, Director, Northern Crops Institute (<http://www.northern-crops.com/>)
- Brian Kalk, Ph.D., Executive Director, Research Technology Park (<https://www.ndsuresearchpark.com/>)
- Kenneth Bertsch, B.S., Commissioner, State Seed Department (<https://www.seed.nd.gov/>)
- Timothy Flakoll, M.S., Provost, Tri-College University (<https://www.tri-college.org/>)
- Denver Tolliver, Ph.D., Director, Upper Great Plains Transportation Institute (<http://www.ugpti.org/>)
- Greg Lardy, Ph.D., Director, North Dakota Agricultural Experiment Station (<https://www.ag.ndsu.edu/research/>)

State Board of Higher Education

Created by constitutional amendment in 1939, the State Board of Higher Education (<https://ndus.edu/sbhe-overview/>) is the governing body of North Dakota State University and all other state supported institutions of higher education in North Dakota. The nine-member State Board of Higher Education is the policy-setting body for the North Dakota University System and consists of seven citizen members who serve four-year terms and who are appointed by the governor, one student who is also appointed by the governor for a one-year term, and one faculty member who is selected by the Council of College Faculties. The board's chief executive officer is the chancellor of the North Dakota University System, with offices in the state capitol in Bismarck. More information regarding the State Board of Higher Education, including members, can be found on the website.

Admission

Our diverse student body is comprised of students from various backgrounds and identities, each seeking an academically rigorous education within a supportive community. No matter what type of student you are, we want to make your application experience as seamless as possible.

Domestic Undergraduate Admission: Choose one of the menu options on the right-hand side of the page to learn more about your specific application process and requirements. Prospective students can also visit the Office of Admission (https://www.ndsu.edu/admission/how_to_apply/) website for undergraduate domestic and permanent resident student application information.

International Admission: Select 'International Admission' in the menu on the right-hand side, or visit the **International Applicants** website for undergraduate international student application information.

Graduate Admission: Admission to the Graduate School is a selective process intended to identify applicants who are outstanding among recipients of baccalaureate degrees. The following minimum qualifications are required of all students seeking an advanced degree:

1. The applicant must have a baccalaureate degree from an educational institution of recognized standing.
2. The applicant must have adequate preparation in the chosen field of study and must show potential to undertake advanced study and research as evidenced by academic performance and experience.
3. At the baccalaureate level, the applicant must have earned a cumulative grade point average (GPA) of at least 3.0, or equivalent, to attain full standing in a graduate degree program. Applicants whose last degree completed is a graduate degree may be admitted in full standing if the final GPA of that degree is at least 3.0 or equivalent.
4. Each program may set higher qualifications and may require the submission of additional evidence of academic performance.

A student shall be permitted to register for graduate study only after formal admission. Programs make recommendations on all applications, but the final admission decision is the responsibility of the Dean of the Graduate College. Prospective students can view admission information in the Graduate Bulletin (p. 975) or log onto the Graduate College (<https://www.ndsu.edu/gradschool/>) website for domestic and international student application information.

Readmission: For more information on returning to NDSU as a former student, select 'Undergraduate Readmission' in the menu on the right-hand side.

Domestic First-Year Admission

Applications for Domestic First-Year Admission are evaluated on an individual basis. The university uses selective criteria in order to assure adequate preparation which will enable students to be successful in their academic pursuits. For full procedures, deadlines and to apply for Domestic First-Year Admission, follow the First-Year Admission Procedures (https://www.ndsu.edu/admission/how_to_apply/first_year/requirements/) outlined online.

Early Entry Admission

The Early Entry Program allows high school students to take courses at NDSU while completing their high school graduation requirements. Students who are in their junior year of high school and have earned a cumulative grade point average of 3.5 or higher are ideal candidates for the program. Early Entry students pay regular tuition and fees.

Students are encouraged to begin the application process at least one month prior to the semester they wish to take classes. See the Early Entry Admission Procedures (https://www.ndsu.edu/admission/how_to_apply/early_entry_program/) to ensure all necessary steps are completed. Students are required to participate in a brief orientation session with an admission representative following registration. To begin enrollment as an Early Entry student, contact the Office of Admission (<https://www.ndsu.edu/admission/contact/>).

Domestic Transfer Admission

NDSU considers a transfer applicant's overall academic performance when making an admission decision. An applicant's cumulative college grade point average (GPA) and high school preparation (if applicable) are taken into consideration when evaluating an applicant. For full procedures, deadlines and to apply for Domestic Transfer Admission, follow the Transfer Admission Procedures (https://www.ndsu.edu/admission/how_to_apply/transfer/) outlined online.

International Student Admission

All international undergraduate applicants must demonstrate English proficiency by providing official results from an approved proficiency exam such as the TOEFL, IELTS, Duolingo English Exam, Pearson's Academic, ACT, or SAT. There are exemptions to this requirement located here (https://www.ndsu.edu/admission/how_to_apply/international/english_proficiency/). Contact the Office of International Student & Study Abroad Services if you feel you qualify for this exemption. For full admission procedures, deadlines, and to apply, follow the steps outlined at on the International Admission (https://www.ndsu.edu/admission/how_to_apply/international/) page. Students who have been suspended from other institutions will not be considered for admission to NDSU until the suspension has been lifted by that institution or until one year has elapsed.

For First-Year international undergraduate admission, applicants must meet the following requirements:

- Applicants should have an educational background in the core curriculum of laboratory science, mathematics, social science, and English. A secondary or high school grade point average of at least 2.75 (4.0 scale) or the equivalent in core subjects is recommended. Students who do not meet these minimum guidelines will still be considered for admission if there is evidence in the student's academic record that demonstrates a high probability of success.

FOR TRANSFER INTERNATIONAL UNDERGRADUATE ADMISSION, APPLICANTS MUST MEET THE FOLLOWING REQUIREMENTS:

- A student is considered a transfer applicant if they have 24 or more transferable college credits completed at the time of application. A decision will be based on your college academic record including coursework attempted, coursework completed and cumulative GPA from all previously attended post-secondary institutions. A post-secondary/university grade point average (GPA) of 2.0 (4.0 scale) or the equivalent, is recommended. Students who do not meet these minimum guidelines will still be considered for admission if there is evidence in the student's academic record that demonstrates a high probability of success.

intensive english language program applicants

The Intensive English Language Program (IELP) at NDSU is designed to help non-native speakers achieve English proficiency. To be considered for admission, all applicants should have an educational background in the core curriculum of laboratory science, mathematics, social science, and English.

Non-Degree Seeking Admission

Special status is reserved for non-degree seeking students who wish to enroll in a limited number of courses at NDSU. Students are limited in the number of credits they can complete as a non-degree student and are not eligible for financial aid. Students currently enrolled at another college or university and planning to take limited coursework at NDSU with intention of transferring NDSU credits to their home institution should follow application procedures for non-degree student status.

Some courses are limited to students in select programs of study, in specified classifications (i.e., junior or senior status), or are restricted by prerequisite/corequisite coursework. Such information is listed in the course descriptions (<https://bulletin.ndsu.edu/course-catalog/descriptions/>) of the catalog or in the course search feature in the student information system, Campus Connection. If restrictions are placed on the courses in which you are interested in enrolling as a non-degree seeking student, permission to enroll may be sought through the academic department responsible for teaching the class.

For full procedures on undergraduate non-degree seeking admission, visit the Non-Degree Seeking Applicants (https://www.ndsu.edu/admission/how_to_apply/non_degree/) website.

For full procedures on graduate non-degree seeking admission, visit the **Non-Degree Graduate Applicants** website.

Selective and Limited Admission Programs

Admission to a number of academic programs is selective and/or limited. Admission to the university does not guarantee entrance to a specific major. Supplemental applications may be required for students seeking admission to professional-level programs. Some programs require that minimum standards be met and maintained for continuous enrollment and advancement in the program. Contact your respective department for further admission criteria.

Undergraduate Readmission

Undergraduate students may find it necessary to take a leave of absence for a variety of reasons before earning an undergraduate degree. Students who were previously admitted and had attended NDSU may wish to return after an absence of at least one full term (excludes summer semester). Students will follow procedures for undergraduate readmission/reactivation. Returning students must have a minimum cumulative GPA of 2.00 in all NDSU and any transfer coursework to be considered for readmission. Undergraduate students requesting readmission should begin the reactivation process with the Office of Registration and Records (<http://www.ndsu.edu/registrar/>) at least 30 business days prior to their expected return so that records may be adequately reviewed and updated to permit further registration. Refer to the Undergraduate Reactivation/Petition for Readmission (<https://dmsforms.ndus.edu/iFiller/iFiller.jsp?fref=1de6e037-8d8b-4cbc-a1d3-23c704553423>) form for further information. Students who are requesting readmission following an academic suspension (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/scholastic-standing/>) from NDSU must pay particular attention to the 'Returning from an NDSU Academic Suspension' section of the form.

Returning graduate students should contact the Graduate College (<https://www.ndsu.edu/gradschool/>) for information on returning from a leave of absence.

Career and Advising Center

Students often choose to enter college without a declared major but with the goal of exploring various academic and career opportunities. At NDSU those students are served through the Career and Advising Center, whose mission is to guide academic exploration, provide academic advising services to undeclared/exploratory students, and support academic and career exploration.

Working one-on-one with an academic advisor in the Center, students choose one of five Exploratory Areas to guide their academic choices. Exploratory Areas are collections of majors at NDSU that can lead to careers in related fields. The five Exploratory Areas (<https://career-advising.ndsu.edu/exploratory-areas/>) are listed below:

- Science, Technology, Engineering & Math (<https://career-advising.ndsu.edu/stem-and-applied-sciences-exploratory-area/>) – an area for students interested in how and why things work or who enjoy using facts and figures to create innovative solutions to issues in fields like science, engineering and agriculture.
- Health & Life Sciences (<https://career-advising.ndsu.edu/health-and-life-science-exploratory-area/>) – an area for students fascinated by science and medicine, who enjoy solving problems and investigating the unknown. Ideal for students interested in a health field by becoming a practitioner or researching, creating and promoting health-related products and information.
- Social Science, Human Services & Education (<https://career-advising.ndsu.edu/social-science-human-service-and-education-exploratory-area/>) – an area for students who want to work in education and other people-oriented, helping fields. Teaching, counseling and advising are just some of the common traits.
- Liberal Arts, Communication & Design (<https://career-advising.ndsu.edu/liberal-arts-communication-design-exploratory-area/>) – an area for students interested in the arts, theory, history and design. Fits well with those who enjoy designing something new and being creative with music, art and language.
- Business Studies (<https://career-advising.ndsu.edu/business-studies-exploratory-area/>) – an area for students interested in working within a variety of settings like corporate offices or non-profit organizations. Leadership, analysis, marketing and persuasion are just a few characteristics common to this area.

Advising staff will confirm a student's choice of Exploratory Area during summer orientation and use it to help build the most appropriate course schedule, incorporating academic interests and goals. Students are encouraged to take 15-16 credits each semester that include general education requirements as well as a course to explore a major of interest. Advisors maintain a list of courses that can either serve as an introduction to a particular major or as a foundational course in that major's curriculum and work with students to select exploratory options.

Students may declare a major – or change their current major to undeclared so they can broadly explore their academic options – whenever they feel confident in doing so. Most students declare a major by the time they have completed approximately 45 credits or about three semesters of classwork.

Location & Contact Information:

306 Ceres Hall

701-231-7111

ndsu.cac@ndsu.edu

<https://career-advising.ndsu.edu/>

Student Financial Information

The resources linked below are aimed at providing students with the most current financial information.

- Financial Aid and Scholarships (<https://www.ndsu.edu/onestop/finaid/>)
- Residency and Tuition Reciprocity (<https://www.ndsu.edu/registrar/records/residency/>)
- Tuition and Fees (<https://www.ndsu.edu/onestop/accounts/>)
- Veteran's Affairs Education Benefits (<https://www.ndsu.edu/veterans/>)

Tri-College University

Tri-College University (<https://www.tri-college.org/>) (TCU) is a consortium of five regional institutions of higher education: NDSU, Concordia College (<https://www.concordiacollege.edu/>), Minnesota State University Moorhead (<https://www.mnstate.edu/>), Minnesota State Community and Technical College (<http://www.minnesota.edu/>), and North Dakota State College of Science (<https://www.ndscs.edu/>). Students at the five schools may benefit from what each institution offers individually and cooperatively through the consortium.

Through the Tri-College course exchange, students enrolled at one campus may take courses at the other institutions at no extra cost and without going through separate admission procedures. Tri-College expands discipline offerings and course availability for students beyond their home campus.

Tuition and Fees

Tuition is paid to the home campus. Courses not eligible for Tri-College registration are those off-campus or weekend courses offered through MSUM's Continuing Education program, most workshops, most graduate courses, independent study courses at Concordia College, private music instruction at Concordia, and international travel programs.

Students enrolling in classes that require special fees (lab/course fees, lessons, supplies, etc.) beyond the home-campus tuition and fees assessed at the time of registration will be responsible for remittance of payment to the provider institution.

Course Limits

The TCU Course Exchange is limited to one course per student per semester per participating campus, and only if the course is not cataloged or offered on the student's home campus in a given semester. Exceptions to the one course/semester limit among campuses are detailed, along with other TCU registration information, on the TCU Registration Information Guide (<https://www.ndsu.edu/fileadmin/registrar/forms/tcu-info.pdf>). All students must be registered at their home campus before being eligible to enroll in Tri-College courses (excludes summer for MSUM and NDSU). Concordia students—and NDSU students wanting to take a course at Concordia—may take only one course per term and then, only if they are full-time students and only if that course is not available on their home campus during that academic term. Concordia does not participate in the TCU course exchange during the summer.

Credits and Grades

Courses taken through TCU course exchange will appear on a student's home campus transcript within the respective term and may be applied toward graduation requirements. Credits and grades are calculated into home campus grade point averages and cumulative totals.

Course Substitutions

Students need to obtain advanced approval to substitute TCU courses for required courses in a major or minor unless otherwise stipulated in the major/minor requirements.

Course Repeats

Students taking a TCU course to repeat a course previously taken at the home campus must indicate this on the Tri-College Registration Form (<https://www.ndsu.edu/fileadmin/registrar/forms/tcu-registration.pdf>). Duplication of credit is not permitted.

Policies and Deadlines

Students must observe all registration and academic policies and deadlines of their home campus, including arrangements for withdrawals, drops/adds, pass/fail options, audits, and incomplete grades. Courses are applied to resident credit requirements only at the institution where they pay tuition.

Registration

NDSU students register by submitting the Tri-College Registration Form (<https://www.ndsu.edu/fileadmin/registrar/forms/tcu-registration.pdf>) to the Office of Registration and Records, 110 Ceres Hall.

Tri-College Minors

The Tri-College partners recognize minors earned through the TCU course exchange. Minors are available to students at Concordia, MSUM, and NDSU. Students receive recognition on their academic transcript for minors completed on one of the other TCU campuses. This policy applies only to minors earned in programs not available on a student's home campus. The Tri-College Minor Form (<http://www.ndsu.edu/fileadmin/registrar/forms/tcu-minor.pdf>) is available online.

Majors

Majors may be earned only at the school from which a student earns a degree. Most students enroll initially at the school from which they intend to graduate. However, the TCU course exchange agreement between MSUM and NDSU allows a student to begin their studies at one of the schools prior

to transferring to the other school to complete their degree. Tri-college students typically are restricted to pre-professional coursework at a campus that offers a professional program of study. Students should work with the chair of the department in which they intend to major to make sure their program includes all requirements for the major and for graduation.

Library Services

Students, faculty, and staff of the TCU institutions may use all of the libraries in the consortia. Circulating materials from TCU libraries are available free of charge for direct checkout or through inter-library loan.

A regional computer-based catalog shows the availability of materials at the TCU and other libraries.

Bus and Parking Services

A Tri-College bus schedule provides inter-campus transportation to Concordia, MSUM, and NDSU every half hour. The bus is operated weekdays by the City of Fargo during the academic year; it is not available during the summer. Bus schedules are available at MATBUS (<http://www.matbus.com/>).

A separate parking permit is not issued for Tri-College University parking. If vehicles have a current home-campus permit, they may be parked in the following lots on other campuses.

- **Concordia:** TCU students, faculty, and staff can park in the O parking lots (<https://www.concordiacollege.edu/directories/offices-departments-directory/facilities-management/parking-services/>).
- **M-State:** Apply for free parking at the Moorhead (https://www.minnesota.edu/about/campuses/moorhead/#Directions_to_Campus) campus.
- **MSUM:** TCU students can park in the G parking lots (<https://www.mnstate.edu/parking/>).
- **NDSCS:** contact Campus Police in the Student Center (<https://www.ndscs.edu/current-students/campus-buildings-services/parking/>) for parking permit information.
- **NDSU:** Parking Lots R, TA, and Fargo Dome lots B, C, D, and E (https://www.ndsu.edu/fileadmin/parking/docs/NDSU_Parking_lots_map.pdf) . Faculty/staff permits are honored in AE and TA lots. Individuals with state-issued mobility-impaired permits may park in any mobility-impaired space on campus provided the Tri-College institution permit and the state-issued mobility-impaired permit are clearly displayed in conjunction with one another. Free parking is not available at NDSU, for Tri-College faculty and staff possessing a retiree parking permit, not issued by NDSU.

All drivers are subject to traffic regulations of the respective institutions. Lot restrictions are eased after 5 p.m., and there is no overnight parking.

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- Transfer and Test Credit

FERPA

The Family Educational Rights and Privacy Act of 1974 (FERPA), as amended, is the Federal law which requires educational institutions to establish written policy with regard to the privacy rights of students and to safeguard their educational records. North Dakota State University is committed to maintaining the privacy and confidentiality of education records in accordance with the provisions of FERPA. As a part of our commitment, students have the following rights pertaining to their educational records at the university:

1. The right to inspect and review the student's education records within 45 days of the day the University receives a request for access.
2. The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights.
3. The right to consent to disclosures of personally identifiable information contained in the student's education records, except to the extent that FERPA authorizes disclosure without consent.
4. The right to request personally identifiable information, or directory information, not be made public.
5. The right to file a complaint with the U.S. Department of Education concerning alleged failure by NDSU to comply with the requirements of FERPA:
U.S. Department of Education
Student Privacy Policy Office
400 Maryland Ave. SW
Washington, DC 20202

Academic Calendar & Final Exams

Calendar Year

NDSU operates on a semester system consisting of two standard 16-week fall and spring semesters, plus a final examination week. A 12-week summer semester is also offered. In all semesters, variable-length, short-session courses are available, and meet the same total contact (class) hours as in a standard semester. See definition of an academic credit (p. 30).

Mid-Term

The mid-term point of a standard semester is approximately 40 class days after the standard semester start. See mid-term grading (p. 35).

Summer Semester

The 12-week summer semester is designed to provide coursework within various time intervals called sessions. Summer classes carry full credit because classes meet the same number of contact hours as in the standard fall or spring semester. Students should refer to the Dates and Deadlines (<https://www.ndsu.edu/registrar/dates/>) webpage on the Registration and Records website for session start and end dates, as well as the drop/add deadlines for the summer semester.

Each college or department determines its summer offerings, based upon previous enrollments, programmatic needs, and special requests. Special effort is made to offer courses approved for fulfilling general education requirements. For information on summer school, please refer to the summer session website (<https://www.ndsu.edu/summer/>).

Final Examinations

The schedule for final examinations is determined and published by the Office of Registration and Records.

Final examinations (NDSU Policy 336 (<https://www.ndsu.edu/fileadmin/policy/336.pdf>)) in one-credit or variable length short courses are usually given during the last regular class period. Final examinations for all other courses may not be rescheduled during the final examination period. According to State Board of Higher Education policy, the final examination period is instructional time and, if an examination is not given, some instructional use of this period is expected. Final examinations for summer school and distance and continuing education classes are arranged by the instructors.

No student shall be obligated to take more than three final examinations scheduled for the same calendar day. In the event that a student has four or more final examinations on the same calendar day, the student shall notify the instructor(s) from the highest numbered course(s) no later than two weeks before the last day of class to schedule a make-up examination to be administered at a mutually acceptable time.

Dead Week

Only one exam or quiz per course may be given during the last two weeks of the semester (prorated accordingly for variable length courses), which includes finals week. Exceptions include summer classes, self-paced/correspondence courses, make-up exams, courses in which laboratory is incorporated with a lecture, one-credit courses, and quizzes that account for less than 5% of the students' overall grade. If a professor chooses to give an exam during the last week of classes, he/she is expected to make some instructional use of the final examination time.

Academic Credit

Definition of a Credit Hour

In accordance with federal guidelines, a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency.

The NDSU established equivalency for courses bearing academic credit reasonably approximates and is not less than:

1. One semester hour of credit is awarded for 750 minutes of classroom or direct faculty instruction and a minimum of 1800 minutes of out-of-class student work; over a fifteen-week semester this is equivalent to one 50 minute period of direct instruction and two hours of out-of-class work each week; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practicum, studio work, and other academic work leading to the award of credit hours.
3. For laboratories, a minimum of 100 minutes per week for 15 weeks is equivalent to one credit.
4. One semester credit of field experience (courses numbered 196-496; 595-895) requires a minimum of 40 hours of direct experience. Students may earn up to 15 credits per semester with the number of credits to be determined in consultation with the student's academic adviser/department. Cooperative Education credits and limits are determined by the Career and Advising Center (<https://www.ndsu.edu/career/>).
5. For undergraduate research experiences, a minimum of 360 minutes per week for 15 weeks is equivalent to 1 credit.
6. For hybrid and online courses, which do not meet the faculty contact requirements, credit is awarded based on the equivalent face-to-face course or by assessing the amount of work required by the student.

Academic Honesty and Integrity

NDSU strives to create an atmosphere of honesty, trust, and integrity amongst its students, faculty, staff.

Faculty members are responsible for providing guidelines concerning academic honesty and expectations at the beginning of the semester for each course.

Students are responsible for submitting their own work. Students who cooperate on oral or written examinations or work without authorization share the responsibility for violation of academic principles and are subject to disciplinary action even when one of the students is not enrolled in the course where the violation occurred. Students have the right to be informed when they are suspected of violating academic principles and have the right to a fair opportunity to refute them.

Faculty have the prerogative of determining the penalty regarding prohibited academic conduct in their classes. Faculty members may, among other sanctions, fail the student for the particular assignment, test, or course involved. Penalties may be varied with the gravity of the offense and the circumstances of the particular case. A student may not drop a course in which they have been formally accused of academic misconduct. Any instructor who suspects a student of academic misconduct must contact Registration and Records to issue an "IP" grade while the investigation is being conducted. Students are prohibited from forfeiting, withdrawing, or dropping any courses for which they have been found guilty of academic misconduct.

Faculty members will report the incident via the Student Academic Misconduct Report (<https://www.ndsu.edu/academichonesty/>) form. In cases of repeat offenses, higher sanctions, up to and including suspension or expulsion may be recommended to the Provost and Committee on Academic Standards.

For complete information regarding academic honesty and integrity, student expectations, disciplinary sanctions, appeal procedures, and hearing guidelines, refer to www.ndsu.edu/academichonesty (<https://www.ndsu.edu/academichonesty/>)

Class Attendance

For NDSU class attendance refer to NDSU Policy Manual, Policy 333 (<https://www.ndsu.edu/fileadmin/policy/333.pdf>) for specific student and instructor responsibilities, including absence information. Class attendance policies may not have discriminatory effect (intentional or unintentional) on members of a protected class (see NDSU Policy 100 (<https://www.ndsu.edu/fileadmin/policy/100.pdf>)). Students and instructors should note that NDSU Student Health Service (<https://www.ndsu.edu/studenthealthservice/forms/>) does not provide students with excuses for class absences or tardiness due to illness or injury.

NOTE: Students are responsible for all registration activity and must follow published dates and deadlines (<https://www.ndsu.edu/registrar/dates/>). Non-attendance does not absolve students from course responsibilities and does not automatically remove courses from a student's academic record.

Co-Curricular Activities

Student participation in co-curricular activities is encouraged as an important aspect of college life and is viewed as helping fulfill social and educational needs as well as developing leadership ability. Information about participation eligibility in co-curricular activities can be found on the Dean (https://www.ndsu.edu/deanofstudents/student_rights_and_responsibilities/eligibility_for_participation_in_co_curricular_activities/) of Students website.

Commencement

Commencement exercises are held at the close of fall and spring semesters.

Students who complete graduation requirements during the summer are eligible to participate in either May or December commencement ceremonies within the calendar year of their graduation. To participate in the May commencement exercises, students must be registered in the remaining graduation requirements for the summer session of the same year.

A student may participate in commencement only once for a particular degree. The date of degree conferral will be printed on the academic transcript and diploma according to the academic calendar of the university.

Reservations for commencement must be made by the date specified by the Office of Registration and Records. Orders for caps, gowns, and hoods are made by the date specified by the NDSU Bookstore (<http://www.ndsubookstore.com/>). Commencement information is available at www.ndsu.edu/commencement/ (<https://www.ndsu.edu/commencement/>).

Degree Types and Diploma Information

Degrees Awarded at NDSU

A degree is the title of the credential that the university confers on a graduate who has completed all university requirements for graduation. Most undergraduate degree recipients at NDSU earn a Bachelor of Science (B.S.) degree, however, many programs of study result in a specialized degree. Students may also pursue a Bachelor of Arts (B.A.) degree, if available for their selected major, by completing the Bachelor of Arts Requirements Using a Second Language (p. 65) and/or requirements as specified by their academic college on the program curriculum guide.

NDSU confers the following degrees at the undergraduate level:

- Bachelor of Arts (B.A.)
- Bachelor of Fine Arts (B.F.A.)
- Bachelor of Landscape Architecture (B.L.A.)
- Bachelor of Music (B.Mus.)
- Bachelor of Science (B.S.)
- Bachelor of Science in Agricultural and Biosystems Engineering (B.S.A.B.En.)
- Bachelor of Science in Architecture (B.S.Arch.)
- Bachelor of Science in Civil Engineering (B.S.C.E.)
- Bachelor of Science in Computer Engineering (B.S.Cpr.E.)
- Bachelor of Science in Construction Engineering (B.S.Con.E.)
- Bachelor of Science in Construction Management (B.S.Cons.M.)
- Bachelor of Science in Environmental Engineering (B.S.Env.E.)
- Bachelor of Science in Electrical Engineering (B.S.E.E.)
- Bachelor of Science in Industrial Engineering and Management (B.S.I.E.Mgt.)
- Bachelor of Science in Manufacturing Engineering (B.S.Mfg.E.)
- Bachelor of Science in Mechanical Engineering (B.S.M.E.)
- Bachelor of Science in Nursing (B.S.N.)
- Bachelor of University Studies (B.U.S.)

In addition, NDSU awards graduate degrees at the following levels:

- Doctor of Education (Ed.D.)
- Doctor of Musical Arts (D.M.A.)
- Doctor of Nursing Practice (D.N.P.)

- Doctor of Pharmacy (Pharm.D.)
- Doctor of Philosophy (Ph.D.)
- Education Specialist (Ed.S.)
- Master of Accountancy (M.Acc.)
- Master of Architecture (M.Arch.)
- Master of Arts (M.A.)
- Master of Athletic Training (M.A.Trg.)
- Master of Business Administration (M.B.A.)
- Master of Construction Management (M.Cons.M.)
- Master of Education (M.Ed.)
- Master of Engineering (M.Engr.)
- Master of Landscape Architecture (M.L.A.)
- Master of Music (M.M.)
- Master of Natural Resources Management (M.N.R.M.)
- Master of Public Health (M.P.H.)
- Master of Public Health in Epidemiology (M.P.H.Epi.)
- Master of Public Policy (M.P.P.)
- Master of Science (M.S.)
- Master of Software Engineering (M.S.E.)
- Master of Supply Chain Management (M.S.C.M.)
- Master of Transportation & Urban Systems (M.T.U.S.)

Degree Posting

Students must declare their intent to graduate, identifying all programs of study, with the Office of Registration and Records or the Graduate College. Degrees are posted to academic records three times per academic year - at the close of each term. Conferral date is the last day of finals week/the last instructional day of the term. Degrees are posted to the academic record approximately three weeks following the close of the semester in which degree requirements were successfully completed.

Diplomas

Diplomas are mailed approximately five weeks following the close of the academic term in which graduation requirements have been completed. Neither diplomas nor official transcripts will be released for students who have outstanding debts owed to the university or who have select other holds. Students are responsible for submitting name and address updates for diploma processing. Should a diploma be returned for an insufficient address, the Office of Registration and Records makes every attempt to obtain an updated address. When an updated address is not available, it is held in the Office of Registration and Records for one year, after which time a student will need to request a diploma replacement.

A diploma replacement (<https://www.ndsu.edu/registrar/records/diplomas/>) service is provided by the Office of Registration and Records for those who have lost or damaged their original diploma.

Accelerated/Combined Degree Programs

NDSU offers accelerated programs of study in a variety of academic disciplines. These programs provide an opportunity for highly-qualified students to earn both a bachelor's degree and master's degree in a cost-effective, high-quality and timely manner. Students may complete a combined undergraduate and graduate program (outline below) or apply to a master's program in a different department to create an undergraduate to graduate educational pathway that best suits their professional aspirations. The following disciplines are currently available as a combined accelerated program where requirements for each degree have been agreed upon by the faculty:

Undergraduate Program	Graduate Program
B.S. in Agribusiness	M.S. in Agribusiness & Applied Economics
B.S. in Agricultural Economics	M.S. in Agribusiness & Applied Economics
B.S. or B.A. in Biological Sciences	M.S. in Biology
Minor in Coatings & Polymeric Materials	M.S. in Coatings & Polymeric Materials
B.S.Cpr.E. in Computer Engineering	M.S. or M.Engr. in Electrical & Computer Engineering
B.S. in Computer Science	M.S. in Computer Science
B.S. or B.A. in Criminal Justice	M.S. in Criminal Justice
B.S. in Dietetics	M.P.H. in Public Health
B.S. or B.A. in Economics	M.S. in Agribusiness & Applied Economics

B.S.E.E. in Electrical Engineering	M.S. or M. Engr. in Electrical & Computer Engineering
B.S. Food Science	M.S. in Cereal Science
B.S. in Human Development & Family Science	M.S. in Human Development & Family Science
B.S.M.E in Mechanical Engineering	M.S. in Mechanical Engineering
B.S. or B.A. in Physics	M.S. in Physics
B.S.C.E in Civil Engineering or B.S.Con.E. in Construction Engineering	M.S.CVE in Civil Engineering
B.S.A.B.En in Agricultural and Biosystems Engineering	M.S. in Agricultural and Biosystems Engineering

Guidelines for Accelerated/Combined Bachelors to Masters Programs

The following guidelines set the minimal expectations for combined/accelerated students and programs. Academic departments may set more stringent standards.

- Student must complete at least 60 credits at the undergraduate level prior to conditional admission to the College of Graduate and Interdisciplinary Studies (<https://www.ndsu.edu/gradschool/>).
- Student must have a cumulative undergraduate cumulative grade point average (CGPA) of 3.50 to be eligible for conditional graduate admission to a accelerated/combined program.
- Interested and eligible students must submit a Combined/Accelerated Program Degree Program Declaration Form (<https://powerforms.docusign.net/b40bdfd4-58b2-46bb-8fb3-3a890efd93de/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) to the director of the graduate program of choice. The graduate program director will evaluate the student's proposed set of graduate classes to determine whether the student will be able to complete them as part of an accelerated program.
- Next, the student's undergraduate major or minor department chairperson/head will evaluate and approve the substitution of the graduate level courses into the undergraduate program as noted in the chart below. A maximum of 15 graduate student credits may be applied to the undergraduate degree.

UGRD Credits to be Satisfied by GRAD coursework	Academic Unit Approving the Course Substitution
Open Electives	UGRD Academic Major
Optional Minor	UGRD Academic Minor
Required Minor	UGRD Academic Minor
Major	UGRD Academic Major

- After receiving the necessary approvals noted above, the student will submit the declaration form to the Graduate School and formally apply for admission to the graduate program.
- All admissions to the Graduate College will be conditional. The minimum condition is completion of the bachelor's degree prior to full standing in the master's program, and the student must maintain a 3.00 CGPA in their graduate classes. Other conditions related to academic performance may be added by the academic unit or Graduate School.
- No undergraduate course may be counted toward a master's degree.
- Students entering the master's degree with a bachelor's degree in hand may not use courses earned as part of the bachelor's program for master's requirements, even if those courses were graduate level courses.
- Students must meet all requirements that would ordinarily be expected of those enrolled in the master's program.

Procedures

1. Students complete and submit a Combined/Accelerated Degree Program Declaration Form (<https://powerforms.docusign.net/b40bdfd4-58b2-46bb-8fb3-3a890efd93de/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) to the graduate department for approval to a combined/accelerated program of study. If signed by the department, students are informed of the Graduate School application process by the Department Program Director.
2. Students must apply for graduate admission to the intended master's degree program. The Graduate School will route the declaration form to the Office of Registration and Records via imaging workflow.
3. Students will be active in both undergraduate and graduate careers. Both programs will include an 'accelerated' sub-plan in Campus Connection when possible and depending on the program. Students will register for graduate courses on their graduate career. A maximum of 15 graduate credits may count toward the undergraduate degree. Graduate courses will not be considered for undergraduate Dean's List (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/scholastic-standing/#deanslisttext>) or undergraduate Graduation with Honor (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/#graduationwithhonortext>) calculations. Enrollment verification will be conducted at the dual-career/combined level.
4. Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid, but are not covered under the tuition cap. Mandatory student fees, however, are capped at 12 credits, regardless of program. If funding permits, students may be supported as teaching or research assistants, thereby qualifying for a tuition waiver on graduate tuition.

5. In order for Student Financial Services to review financial aid eligibility, the graduate courses counting towards the undergraduate major must be detailed in the *Combined/Accelerated Degree Program Declaration Form*.
6. Graduate courses to be utilized on an undergraduate curriculum will require a substitution form to fulfill undergraduate requirements. Forms will be submitted by the undergraduate academic department of the student's major to the Office of Registration and Records.
7. Students must complete all baccalaureate degree requirements at least one semester prior to the term in which the graduate degree is to be conferred. *NOTE: Enrollment should not need to be monitored since students are registering on respective GRAD and UGRD career and applying for graduation for their respective career.*
8. Before receipt of baccalaureate degree, the graduate courses/credits included on the *Combined/Accelerated Degree Program Declaration Form* (up to 15 credits) will be transferred onto the undergraduate record by the Office of Registration and Records. These courses/credits will be included in the undergraduate degree and credit totals. The courses will not be detailed on the undergraduate record, but rather appear as NDSU transfer credit from the Graduate School. A transcript note will be applied after the transfer cumulative strip that reads: "Coursework displayed on the graduate record and applied to the undergraduate degree requirements as part of an approved accelerated/combined plan of study".

Grades and Grading

Grades and Honor Points

NDSU has three grading periods per academic year: fall semester, spring semester, and summer session. The quality of student work and achievement of learning outcomes is indicated by a letter grade. In computing scholastic averages, each letter grade is assigned a specific number of honor points for each credit earned. Student work is reported in terms of grade-point average for the term and institutional grade-point average for the composite of work at NDSU. Calculations are based on the following:

Grade Descriptions

Passing Grades

		Honor Points Per Credit
A	Excellent	4.0
B	Good	3.0
C	Average	2.0
D	Passing	1.0
P	Pass (D or better) - undergraduate	*
S	Satisfactory (C or better) - graduate	*
W	Withdrew	*
AU	Audit	*

Non-passing Grades

		Honor Points Per Credit
F	Failure	0.0
I	Incomplete	*
U	Unsatisfactory - graduate	*

* Not calculated in grade-point average, but may be calculated in attempted credits for satisfactory academic progress (<https://www.ndsu.edu/onestop/finaid/sap/>) (SAP) used for financial aid eligibility.

Grade Point Average (GPA) Calculation

Semester (or term) GPA refers to the grade-point average for any given grading period. Cumulative or institutional GPA refers to the composite grade-point average for all courses and grading periods completed at NDSU.

Institutional cumulative grade-point average is calculated by dividing the total number of honor points earned at NDSU by the total number of credit hours in which honor points were recorded, including grades of 'F'. NDSU GPA calculations do not include developmental coursework, which does not count toward the graduation requirements. Coursework/grades accepted in transfer by NDSU are not included in the institutional cumulative GPA, and are not used in calculations for determining academic standing with the University. Refer also to Pass/Fail Grading and Repeated Courses.

Course Failures

A failing (F) grade may not be removed by special examination or transfer credit. When a failing grade has been assigned, credit for that course may be earned only by repeating it at NDSU, or via Tri-College, and completing the course satisfactorily. Review the Repeated Courses (p. 36) policy for full details.

Pass-Fail Grading

Pass-fail grading is available for undergraduate courses; however, the pass/fail option may not be used for courses taken to meet general education requirements, unless the course is only offered pass/fail. Students are advised to check degree-program restrictions regarding acceptance of pass/fail credits. Pass/Fail Option Request forms (<https://www.ndsu.edu/registrar/forms/passfail/>) may be acquired online. Forms must be signed by the student's adviser. Pass/fail policies include the following:

1. Students are limited to a total of 16 credits under the pass/fail grading option. Courses that are offered only for pass/fail grading for all students who enroll are not included in the 16-credit limitation. (Waived during the COVID-19 pandemic in spring 2020 and fall 2020.)
2. Approval for the pass/fail option must be filed in the Office of Registration and Records by the published pass/fail deadline of the semester (<https://www.ndsu.edu/registrar/dates/>). Variable length and summer courses have prorated deadlines according to actual course length. Review the online dates and deadline schedule (<https://www.ndsu.edu/registrar/dates/>) for specific information regarding variable length and summer course deadlines.
3. Once a pass/fail request has been submitted and processed, it may not be changed back to a regular letter grade.
4. A grade of 'P' is without honor points and is not included in the grade-point computation; however, a grade of 'F' is included in the grade-point computation.
5. If a course is taken for a regular grade, it cannot be repeated on a pass/fail basis.

Mid-Term Grading

As an early intervention effort to improve retention and academic progress of students, faculty are encouraged to enter deficient mid-term grades of D and F, at minimum, in undergraduate courses. Notifications are sent to students with reported deficient mid-term grades and to academic departments/advisers. For all courses, mid-term progress updates shall be made available to students upon request. Mid-term grades are not considered official grades and do not appear on student academic transcripts.

Final Grades

Grades for all students in all degree-eligible courses are entered by the grade loading deadline each term to allow important end-of-term academic and financial processes to run, and to ensure timely notifications may be sent to students. Final grades entered into Campus Connection by instructors are posted to student records approximately 2-3 business days after the close of final examination week.

Grade Changes

With the exception of incomplete grades, a course grade issued by an instructor and recorded on an academic record is considered final. For the student who has reason to believe the grade issued is incorrect, the student must initiate a request for a change of a grade with the instructor within fifteen (15) instructional days of the first day of the semester immediately following the semester in which the grade was assigned. For Spring Semester courses, the request may be made within fifteen (15) instructional days of the start of Fall Semester, if the student is not enrolled for the summer term. If deemed appropriate, the instructor may submit a change of grade to the Office of Registration and Records via a **Grade Reporting Form**. Grade changes may only be considered for students who have not yet earned a degree.

Grade Appeals

If resolution is not reached through a standard grade change inquiry and within the time frame outlined in the Grade Changes section, a student may pursue a grade appeal. The Grade Change Appeals Board may be utilized only after the student has exhausted possible appeal routes within the academic department and college offering the course. A grade appeal is deemed formally initiated when the student presents the Grade Appeal Form (https://www.ndsu.edu/fileadmin/provost/Forms/Grade_Appeal_Form.pdf) to the instructor. If there is an unsatisfactory decision, the student must consult the department head/chair, and the dean or a designated college committee, proceeding from one level to the next only after an unsatisfactory decision of the conflict at that level. In the event that the instructor is also the department head or dean, he or she need only be consulted in the capacity of instructor. In the event of an unsatisfactory decision within the college, the student may submit the formal written appeal to the Grade Appeals Board Chair. Such an appeal shall be made within fifteen (15) instructional days after conclusion of the college proceedings as stated above.

The full Grade Appeals policy (section 337) (<https://www.ndsu.edu/fileadmin/policy/337.pdf>), which includes hearing procedures, is available on the NDSU Policy (<https://www.ndsu.edu/policy/>) web site. Grade appeals only may be considered for students who have not yet earned a degree. If a student is in their final semester of enrollment pending a degree completion, the student has fifteen (15) instructional days to initiate a grade request.

Grades of Incomplete

Under extraordinary circumstances and at the discretion of the instructor, a student may be assigned a grade of Incomplete (I). The following policies apply to Incomplete grades:

1. The grade of Incomplete is assigned to indicate that satisfactory work has been completed up to within five weeks of the semester end, and that circumstances beyond the student's control prevented completion of the work. The time period is proportional for variable length courses and summer session.

2. The grade of Incomplete is not to be given in any instance where the student has a deficiency of more than five weeks (or equivalent) of work including final exam week.
3. Grades of Incomplete are initiated by student request. The student must contact the instructor, request an Incomplete grade, and, upon instructor approval, make arrangements to complete the work.
4. The grade of Incomplete (I) is an administrative grade that may only be entered by the Office of Registration and Records, except in courses designated as practicum, internship, individual study, field experience, or study abroad.
5. **FORM and DEADLINE:** An **Incomplete Grade Reporting Form** detailing the work to be completed, expected completion date (see #6), and grading standard is to be completed by the course instructor. This is an electronic form submitted to the Office of Registration and Records by the grade submission deadline for the semester in which the course was taken.
6. Grades of Incomplete, including those for most course types identified in #4, must be removed no later than the end of the seventh week of the next full semester (fall or spring) or by the completion date set by instructor if other than the standard seventh week. The time period is proportional for variable length courses and summer session.
7. Grades of Incomplete are removed when the student has completed all course requirements and the instructor of the course files a **Grade Reporting Form**.
8. All grades of Incomplete that are not removed within the specified time are automatically changed to 'F' grades by the Office of Registration and Records.
9. Instructors may specify completion deadlines for remaining work on the **Incomplete Grade Reporting Form** earlier than the standard deadlines.
10. Requests for extensions beyond the expected completion date require approval by both the instructor and the chair of the department offering the course. The extended deadline must be indicated on the **Incomplete Grade Reporting Form** and may not exceed two Incomplete conversion/deadline cycles. If a grade is not submitted by the specified deadline, the Incomplete grade will convert to a grade of 'F'. Contact Registration and Records for date extension.
11. Grades of Incomplete, which convert to grades of 'F', earned in the last semester of attendance by a student who leaves the university for two or more years may be changed to Withdrawn ('W') upon re-enrollment. Requests for this privilege must be filed with the Office of Registration and Records during the first term of re-entry.
12. An Incomplete grade may be converted to a letter grade (or P/F, S/U) according to the above guidelines, but may not be expunged from the record.
13. Students may not register in courses in which they currently hold grades of Incomplete, except for courses that are repeatable for credit.
14. Students are not allowed to graduate with Incomplete grades on their academic records. Upon graduation, unconverted Incomplete grades will convert to grades of 'F'. If a course in which an Incomplete grade was assigned is required for graduation, the instructor may extend the deadline according to the above procedures and timelines, and graduation will be postponed.
15. Students who receive grades of Incomplete or converted grades of F may appeal disputed grades in accordance with NDSU Policy, Section 337: Grade Appeals Board (<https://www.ndsu.edu/fileadmin/policy/337.pdf>).

Repeated Courses

At NDSU, repeating a course is defined as retaking the same course on a student's NDSU academic transcript in an attempt to improve a grade. The course repeat option to improve one's academic record is available to students who have not graduated. Repeats are processed at the end of a semester after grades have been posted to academic records. Exceptions to repeated courses cannot be considered due to the GPA impact on student records. The following criteria applies to repeated courses:

1. Credit earned in any given course (or equivalent course) is applicable to a degree requirement only once.
2. If a course is completed at NDSU first and an attempt is made to repeat that course at another institution, the credit is considered duplicate and is not eligible for transfer back to NDSU.
3. An NDSU student may register for a Tri-College course to repeat a course previously taken at NDSU (see Tri-College rules and restrictions (<https://bulletin.ndsu.edu/undergraduate/tri-college/>)).
4. All grade entries remain on the student's academic record, but only the credits, grades and related honor points for the most recent attempt will be calculated in the cumulative grade point average and credits for graduation. Previous attempts are excluded from cumulative totals and marked as *'Repeat Excluded'*.
5. Students forfeit the previous letter grade no matter what letter grade is earned when the course is repeated and the most recent course is marked *'Repeat Included'*.
6. There is no limit to the number of different courses that may be repeated unless otherwise restricted by an academic department.
7. A student is limited to a maximum of three attempts in any course. An "attempt" includes any instance in which the student earns a letter grade for the course (A - F; including transfer). The three-attempt limit does not apply to courses identified as "May be repeated" in the course description. A student can petition for exception to this limitation through established university procedures.
8. Courses taken for A-F grading may not be repeated under the pass-fail grading option.
9. Repeat attempts made in semesters following a degree posting will remain on the academic record along with the new grade, but will be excluded from GPA and credit calculations. The repeated course will be marked "Repeated: Post Degree-Not Included in Cum Totals."

NOTE: Repeating courses has impacts to financial aid eligibility and can effect a student's completion rate. For more information contact NDSU One Stop.

Military and Veteran Information

In compliance with Title 38, United States Code, section 3679e, **Veterans Benefits and Transition Act of 2018**, North Dakota State University permits Covered Individuals to register, attend and participate in classes with a Certificate of Eligibility or VA Form 22-1905. Covered Individuals are defined as veteran students using chapter 31 (Vocational Rehabilitation and Employment) and chapter 33 (Post-9/11 GI BillTM).

North Dakota State University does not impose any penalties or late fees, does not deny access to classes, libraries, or other institutional facilities, or require Covered Individuals to borrow additional funds to meet his/her financial obligations to the institution due to the delayed disbursement of funding from the VA.

For more information, visit the Military and Veterans Certification (<https://www.ndsu.edu/veterans/>) website.

Project 65

Individuals aged 65 or over may audit one course per semester free of tuition and related mandatory fees (SBHE Policy 805.3.4 (<https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/ERz-5f5CTfRJl5Nvm309yRcBYgJag-vqA3ta0qEjZux5Ng/?rttime=cmgimLcJ2Ug>)). First time Project 65 participants must complete an application through the Office of Admission to get started. Once the application is complete, participants are responsible for course selection and need to obtain a Class Permit from the academic department teaching the course. The instructor/department staff will issue the Class Permit with the Project 65 authorization. Class Permits must be received in accordance with published dates and deadline for the semester.

As a course auditor (<https://bulletin.ndsu.edu/academic-policies/registration/#auditingtext>), participants of Project 65 are encouraged to purchase the textbooks for their courses. The transcript of a Project 65 participant will show a grade of 'AU' (audit) for the course, which will not count as credit toward a degree. By definition, an auditor may attend class only as a listener. Participants wishing to earn credit must be fully admitted to a degree program, pay all tuition and fees and complete all course assignments and tests.

Participants may contact Registration and Records (<https://www.ndsu.edu/registrar/>) with questions about the program.

Registration

Students must be properly admitted and fully enrolled to attend classes. Students ultimately are responsible for all course registration activity and they are expected to monitor their schedule of classes and drop courses that they do not intend to complete by the published deadlines; this includes dropping individual courses or withdrawing from a semester. Dates and deadlines for advising and registration are made available in the Dates and Deadlines Calendar (<https://www.ndsu.edu/registrar/dates/>) posted online. Students are encouraged to visit with an academic adviser before registering for classes (see Academic Advising (p. 43)).

Schedule of Classes: The most current and complete listing of classes is made available in Campus Connection, NDSU's official student information system, approximately one month prior to the start of registration for a subsequent term.

Online Registration: Admitted students register online via Campus Connection (<https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/?cmd=login&languageCd=ENG&>), NDSU's student information system. Registration instructions (<https://www.ndsu.edu/registrar/registration/>) are posted online.

On-site Registration: On-site registration is provided for new students at the beginning of fall and spring semesters.

Summer Registration: Registration for summer session occurs during the previous spring at the same time as registration for fall semester.

For registration purposes, students are grouped into the following general categories:

- **Currently enrolled students:** Currently enrolled students or those who had registration in a prior standard semester (fall or spring) are assigned registration appointment times according to total credits earned. Registration appointments can be viewed on Campus Connection.
- **Returning students:** Returning students are those who have previously attended NDSU, but who have not been in attendance for at least one full semester (fall or spring). Returning students are assigned a registration appointment time according to total credits earned after the *Reactivation/Petition for Readmission* is received and processed in the Office of Registration and Records. Registration appointment times may be viewed on Campus Connection.
- **New students:** Detailed information regarding orientation and registration options is sent to all new students from Student Success Programs (<https://www.ndsu.edu/studentsuccess/>). Incoming freshmen, including first year students with transfer credit, are expected to attend a new student orientation and registration session.
- **Transfer students:** Admitted transfer students may register on Campus Connection along with NDSU students, or may attend a transfer orientation and registration program. Transfer student registration appointment times are based on the total number of credits accepted in transfer to NDSU.

Financial Obligation Agreement

The North Dakota University System Financial Obligation Agreement (<https://www.ndsu.edu/onestop/accounts/foa/>) (FOA) is used to verify that a student has acknowledged their financial responsibility to the University when they register for courses. Students must access, review and accept the FOA prior to registration for each term of enrollment in Campus Connection.

Classroom Instruction Mode

The university offers classroom instruction in a variety of methods. The course delivery method is assigned to each class and can be viewed when the student is enrolling for classes. Instruction modes include:

- **On Campus Face to Face** - Describes the traditional classroom setting where the instructor and students are physically located in the same place and may incorporate the use of multiple supportive technologies as appropriate.
- **Off Campus Face to Face** - Describes the traditional classroom setting where the instructor and student are physically located in the same place in an off campus location and may incorporate the use of multiple supportive technologies as appropriate.
- **Online Asynchronous** - Online instruction occurring independent of time or location
- **Online Synchronous** - Online instruction occurring independent of location, but at the same time (real time).
- **Interactive Video (IVN)** - A video and audio communications session between two or more remote sites with live, animated image transmissions and display. This connection allows for both the faculty and students to be seen and heard by each other.
- **Hybrid/Blended** - A form of instruction that includes students from different locations and/or environments (face-to-face, online, IVN, etc.) for synchronous and/or asynchronous instruction.
- **Independent Study** - Instruction is provided in a self-study, self-paced format where the instructor and student mutually establish method(s) of communication.

Changes in Registration (Adding & Dropping)

Registration deadlines for standard fall and spring semester courses are posted in the online Dates and Deadlines calendar (<https://www.ndsu.edu/registrar/dates/>). Deadlines for variable length and summer session courses are adjusted proportionately and are also available online (see Summer Registration information). Students ultimately are responsible for all course registration activity and they are expected to monitor their schedule of classes and drop courses that they do not intend to complete by the published deadlines; this includes dropping individual courses or withdrawing from a semester.

Adding Courses/Sections

Students may add courses to their schedules via Campus Connection until the published deadline to add online. After the deadline to add online, an authorized "Class Permit" for each course to be added must be acquired from the department offering the course and submitted to the Office of Registration and Records (<https://www.ndsu.edu/registrar/>) or NDSU One Stop (<https://www.ndsu.edu/onestop/>).

Enrollment Add Deadline & Class Permits

All undergraduate and graduate students are expected to have added their courses via Campus Connection one week from the start of the semester. After one week, departments/instructors must provide student(s) with a course permit to add course(s). Class permits are accepted through the fourth week of a semester. Full semester course additions will not be processed after fourth week enrollment census, unless approved by the Graduate School Dean or the Registrar. Contact the Office of Registration and Records for course add deadline (https://www.ndsu.edu/registrar/dates/course_add_deadline/) information.

Dropping Courses/Sections & Administrative Drops

Students who register and determine they no longer wish to be enrolled **on or after the first day of classes** are responsible for all course registration activity and should drop courses that they do not intend to complete. Student failure to drop courses by posted deadlines will result in failing grades and debt owed the university.

No-record drops: Students may drop a course from their schedule without it appearing on their academic record until the published *No Record Drop* deadline for standard and variable length courses.

Record (W) drops: Students may continue to drop courses after the no-record drop period until the published *Drop* deadline for standard and variable length courses. However, such drops are recorded on student transcripts with 'W'. Grades of W do not count as attempted credit for grade-point averages on the academic record, but are counted in attempted credits for financial aid satisfactory academic progress (<https://www.ndsu.edu/onestop/finaid/sap/>) (SAP).

Instructor Drop Procedure: Instructors or departments have the option to administratively drop students who have not attended the first week (and in some cases, the first meeting) of a lecture or laboratory, or who do not meet all course requisites. Administrative course drop requests made by instructors/departments should be submitted to the Office of Registration and Records within the first week of a class meeting for processing. As

indicated, students are responsible for all course registration activity; students should not rely on instructors or departments administratively dropping them.

Cancellation of Registration (before classes start)

Students who register and then decide not to attend NDSU **before** the semester start date must cancel their registration by submitting a **Cancellation of Registration/Withdraw to Zero Credits** form. Forms must be submitted to NDSU One Stop. Cancellations are not accepted by telephone, and it is not possible to cancel registration or to drop an only or last course online using Campus Connection. Cancellations completed **prior to the semester start date** result in a full refund and no academic transcript.

Withdrawal to Zero Credits (after classes have started)

Students who have registered and then wish to drop all courses **after the semester start date** must officially withdraw from the university. Failure to initiate the withdrawal process may result in 'F' grades and financial obligations that otherwise might be avoided. Refund (<https://www.ndsu.edu/onestop/accounts/refunds/>) information may be reviewed on the One Stop website. Steps to withdraw from all courses include the following:

1. Read and complete the Cancellation of Registration/Withdraw to Zero Credits Form (<https://www.ndsu.edu/registrar/forms/withdraw/>). Submit to NDSU One Stop.
2. Students are responsible for any unpaid bills at the time of withdrawal.
3. Withdrawal forms must be submitted by the published deadline of the semester. Withdrawals after this date will not be processed without evidence of a compelling reason or circumstance beyond the student's control. Courses already completed at the time of withdrawal from a term will be withdrawn as well.
4. Students should not attempt to drop all of their courses, their last course, or their only course on Campus Connection.
5. Unlike refunds for individual course drops, withdrawal refunds (https://www.ndsu.edu/onestop/accounts/dropping_withdrawing/) are prorated and are based on complete withdrawals from all courses, course lengths, and withdrawal dates.
6. If a final grade for any course taken in the semester is posted to the NDSU transcript, students are not eligible to Withdraw to Zero Credits. Students may drop the remainder of courses in accordance with the published drop deadlines for the semester (see Dropping Courses/Sections & Administrative Drops above). Students may view their unofficial transcript in Campus Connection.

Retroactive Withdrawals

Students seeking to withdraw after final grades have been posted to the academic transcript as a result of extenuating circumstances beyond their control may appeal for a retroactive withdrawal. Retroactive withdrawals must be considered for all courses taken in one or more semesters as a result of these extenuating circumstances; selective course drops are not allowed. A student will complete the *Appeal for Retroactive Withdrawal*, which requires:

- the student to acknowledge a series of academic statements;
- provide a detailed explanation of the extenuating circumstances that were beyond the control of the student and impacted the student's learning during the identified semester(s), and;
- includes dated documented evidence of the circumstance which prevented the student from either learning during the semester or from withdrawing on or before the published deadline for the semester(s).

Once the appeal material is complete, the *Appeal for Retroactive Withdrawal* may be submitted to the Office of Registration and Records. Appeals are reviewed and final decisions are rendered in the college of the student's current academic major by either a designated individual or appointed committee. Decisions by the college are final.

Students must submit An *Appeal for Retroactive Withdrawal* prior to 3 years after the term of the last date of attendance in that semester.

The appeal request must be submitted prior to three years after the term of the last date of attendance at NDSU.

Auditing & Wait Listing Courses

Auditing Courses

An auditor may attend classes only as a listener, without participation in regular class exercises, and may be admitted to classes only with a class permit and official registration as an auditor. No credit is received for audited courses, and 'AU' appears on the transcript. A student cannot fail an audit; however, an instructor may assign a 'WAU' (withdrawn) for non-attendance.

A student may drop a regularly registered course and add it as an audit course by submitting a Class Permit by the published deadline. Once the audit registration is processed, the decision cannot be reversed. An audit fee of one-half of the regular tuition rate, based on the student's residency, will be charged and included in the tuition cap. No student fees will be assessed.

Wait Listed Classes

NDSU utilizes a wait list feature in Campus Connection for most classes. Students attempting to register for a class that has reached its enrollment capacity may add themselves to a wait list. Wait list processes run daily until the No Record Drop deadline for a class. Students should monitor their position on a wait list and may be automatically enrolled if a seat becomes available and no holds or course restrictions prevent enrollment. Students are notified via official NDSU email if enrolled in a class via the wait list process, but are ultimately responsible for any registration activity. Students no longer wishing to be enrolled in a wait listed class must drop it from their study list on Campus Connection. Students wishing to enroll in a class that does not utilize the wait list process should contact the academic department offering the course for enrollment options.

Dual Career/Level Registration

Students are permitted to register for classes according to their classification level with the university.

1. **Graduate students who wish to enroll in undergraduate coursework must follow the procedure below that most closely matches their academic intent:**
 - If undergraduate coursework is a prerequisite or condition of admission to a graduate program of study, obtain approval from the Graduate School (<https://www.ndsu.edu/gradschool/>). This coursework will be billed at the undergraduate rate and will be recorded on an undergraduate academic record.
 - If undergraduate coursework is to be applied to an undergraduate program in which the student plans to enroll concurrent with a graduate program of study, submit either an Undergraduate Application for Admission (https://www.ndsu.edu/admission/admission_information/application/) (if never enrolled as an undergraduate at NDSU) or a Reactivation Form (<https://www.ndsu.edu/registrar/forms/reactivation/>) (if previously enrolled as an undergraduate at NDSU). This coursework will appear on an undergraduate academic record and be billed at the undergraduate rate. Graduate tuition waivers may not cover undergraduate coursework.
 - If undergraduate coursework is to be applied to a graduate program of study (select programs only), obtain approval from the Graduate School. This coursework will appear on a graduate academic record and be billed at the graduate rate.
2. **Undergraduate students who wish to enroll in graduate coursework must follow the procedure below that most closely matches their academic intent:**
 - If graduate coursework is to be applied to a graduate program of study, the student must be admitted to the Graduate School. This coursework will appear on a graduate academic record and be billed at the graduate rate.
 - If graduate coursework is to be applied to an undergraduate program of study (such as in substitution for a degree requirement), departmental permission is required. This coursework will appear on an undergraduate record and will be charged at the undergraduate rate. Such credit may not be applied to a graduate degree program of study at NDSU.

Dual Career Registration forms (<https://www.ndsu.edu/registrar/forms/>) and instructions for ensuring that undergraduate and graduate coursework are applied to the appropriate academic career records are available online.

Collaborative Registration

A collaborative student is one who chooses to enroll at more than one North Dakota University System (NDUS) institution for a particular term. The institution from which the student is earning a degree is considered the **"home institution"**. The institution(s) that supplies courses for a degree is considered the **"provider institution(s)"**. The following guidelines pertain to courses taken collaboratively:

1. A student must be enrolled in at least one degree credit course at NDSU before enrolling in a collaborative course including the summer semester. Excluded from this requirement are students using the faculty/staff tuition waiver.
2. Only fully admitted undergraduate and graduate students in good academic standing (GPA of 2.0 or higher) are allowed to enroll collaboratively. Students requiring ASC 86 or ASC 87 are exempt from the academic standing requirement.
3. The collaborative process allows NDSU to combine credits from more than one NDUS institution for the purpose of financial aid (for courses added through the seventh business day from the start of the term).
4. Collaborative courses are not subject to the NDSU tuition cap.
5. The student pays provider institution tuition/fees for collaborative course(s). This additional amount is included in the student's accounts receivable balance at NDSU.
6. Not all scholarships will pay for collaborative tuition and fees assessed by the non-NDSU/provider campus. Please check with the awarding organization to confirm. NDSU-funded tuition discounts may not be applied to any collaborative charges.
7. Students must be in good financial standing to be eligible for collaborative course registration.
8. The student cannot exceed a total of 20 credits between NDSU and the provider institution(s) without special permission from the Registrar at home and provider campuses.
9. The student must follow NDSU's academic dates and deadlines for adding/dropping collaborative courses.
10. Drops/adds must be administered by submitting an updated collaborative registration form to the home institution. NDSU students may submit the form to the Office of Registration and Records, 110 Ceres Hall.
11. Courses will be posted to the NDSU academic record as transfer credit once NDSU receives an official transcript from the provider institution. **Note:** *Grades earned in collaborative courses may be used in determining financial aid satisfactory progress.*

- a. Graduate students using collaborative credits to satisfy NDSU graduate program degree requirements must either a) list the collaborative credits as transfer credits on their plan of study form, or b) submit the Request for Change to Plan of Study (<https://powerforms.docusign.net/20c075c4-741c-4c43-8767-4c48338ddfaf/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) form and indicate which degree requirements the collaborative credits are satisfying on their advisement report.
12. Completion of the Collaborative Student Contract and Registration Form (<https://www.ndsu.edu/registrar/forms/collaborative/>) does not guarantee registration into the requested course(s). Registration is not considered completed until the student has received confirmation of enrollment from the provider institution. However, if the request(s) cannot be processed, the student will be notified via their NDSU e-mail address.
13. Collaborative registration is not an option for repeating courses previously taken at NDSU. If students wish to take advantage of the repeated course opportunity to improve a grade, that course must be repeated at NDSU.
14. Due to federal compliance, course repeats via collaborative registration will be prohibited to prevent significant federal financial aid impacts which could result in over-payment of federal financial aid funds.
15. The option to wait-list is subject to the provider institution's discretion and does not guarantee enrollment into the requested course(s).

Summer Registration

The 12-week summer session is designed to provide instruction within various time intervals throughout the summer. Classes are offered in one of three standard sessions - the full 12-week session, a standard four-week session that begins in May, or a standard eight-week session that begins in June - as well as other short or variable length sessions throughout the summer. While the time interval of the individual sessions is different than that of the standard semester (16 weeks), each course carries full credit because classes meet the same number of contact hours as in the standard fall or spring semesters. In addition, deadlines for variable length and summer session courses are adjusted proportionately. Students are responsible for making changes to their registration according to published summer deadlines (<https://www.ndsu.edu/registrar/dates/>).

Each college or department determines its summer offerings, based upon previous enrollments, programmatic needs, and special requests. Special effort is made to offer courses approved for fulfilling general education requirements. The summer session course offerings schedule (<https://www.ndsu.edu/summer/>) is available online.

Fees and Housing

Summer tuition and fees are available online (<https://www.ndsu.edu/onestop/accounts/tuition/>). Information concerning summer housing may be secured by contacting the Department of Residence Life (<https://www.ndsu.edu/reslife/>), Dept. 5310, P.O. Box 6050, Fargo, ND 58108, or 231-7557 (toll-free 1-800-572-8840).

Graduate Work

A range of opportunities is available for graduate work during the summer session as evidenced by the traditionally high enrollment of graduate students. A considerable number of graduate courses are offered, but generally the summer serves as an important term for students to work on their research requirements, especially if field work is involved. Work on disquisitions and individual study arrangements frequently are facilitated during summers. Courses scheduled to begin at different times and for varying periods provide a high level of flexibility. Thus, those who may have only a portion of a given summer available are likely to find courses that meet their scheduling limitations. In addition, workshops, internships, and other special programs are offered. Teachers generally find the summer school designed to offer attractive selections as components of a degree program, as well as courses directed toward improvement of professional skills. Persons interested in graduate programs of study are encouraged to contact the Graduate School (<https://www.ndsu.edu/gradschool/>) for further information.

Student Credit Load

The recommended credit load for undergraduate students is 15-18 hours per semester during a standard academic term (fall/spring). Undergraduate and professional student full time status is 12 or more credits per semester (9 credits in the summer*). Half time is 6 credits per semester (5 credits in the summer*).

Undergraduate students are limited to 20 credits per semester (15 credits in the summer). Students who find it necessary to exceed this credit limit must have an NDSU minimum institutional grade-point average of 3.0 to be eligible to petition for an overload. The Over 20 Credits Petition Form (<https://www.ndsu.edu/registrar/forms/>) is available online.

Graduate student full time status is 9 or more credits per semester (6 credits in the summer*). Half time is 5 credits per semester (3 credits in the summer*). Graduate students may enroll in up to 15 credits per semester and must obtain approval from the Graduate School (<https://www.ndsu.edu/gradschool/>) to exceed this maximum.

*Please be aware that the credit requirements for financial aid purposes (<https://www.ndsu.edu/onestop/finaid/application/>) are different from those set by the Office of Registration and Records, Customer Account Services and the College of Graduate and Interdisciplinary Studies.

Student Transcripts

Transcripts

Official transcripts may be requested online through Campus Connection (<https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST>) (current students) (Academic Records Tile > Official Transcript Request) or through Parchment (former students). Online ordering provides 24/7 access and additional tracking information. According to federal law, telephone requests and requests from others on behalf of the student cannot be honored. There is a charge for an official transcript. See Official Transcript Requests (<https://www.ndsu.edu/registrar/records/transcripts/>) for detailed transcript fee information. An official transcript request by a student who is in debt to the university will not be honored until the indebtedness has been paid. The transcript only includes detailed work completed at NDSU. Requests for transcripts of work completed elsewhere must be made directly with the respective institution.

Current students may obtain unofficial transcripts (<https://www.ndsu.edu/onestop/connect/unofficial/>), any time, free of charge, on Campus Connection.

Correction of Transcript Errors

If a student believes there is an error in the recording of a course grade on the transcript, the student should first contact the instructor to verify the grade. Other transcript questions or concerns should be directed to the Office of Registration and Records (<https://www.ndsu.edu/registrar/>). See also the sections on Grade Changes and Appeals.

Undergraduate Policies

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- CLEP Exam
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- IB Program
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English and Mathematics Placement (p. 50)

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- Academic Progress
- Dean's List
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Academic Planning

Students are advised to prepare short- and long-range plans according to curricular guidelines for the degree program selected. Attention to such details as semester credit loads and course sequences are recommended for optimum experiences.

Academic Advising

The academic advising program at NDSU is designed to facilitate the student's intellectual and personal growth, to assist students in using university resources, and to guide students in making informed choices regarding academic and career plans. Following admission to NDSU, each student is assigned an adviser from the college or department in which the student is majoring. If a major has not been declared, an assignment is made with an adviser in the Career and Advising Center (<https://career-advising.ndsu.edu/>). Advisers assist students in selecting courses to ensure a balanced education and they help interpret university and college policies and requirements. However, students are responsible for their academic decisions and meeting all program requirements including the selection of courses, meeting course requisites (co-requisites/prerequisites), and adhering to policies, procedures, and deadlines. Students are encouraged to see their adviser prior to registration and to consult the university Bulletin for all degree program requirements. Students with adviser holds are required to meet with their advisers before the hold is lifted. Adviser assignments and holds can be viewed on Campus Connection.

Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) is an interactive planning tool for students and advisors to plan a path to graduation. Degree Map works alongside the Academic Requirements Report (<https://www.ndsu.edu/registrar/academics/advising/advisement/>) within Campus Connection, so students can plan their class schedules, remaining requirements, and set academic and career goals to discuss with their academic adviser.

Advisers also assist students with campus resources, referrals, career planning, and campus policies and procedures. NDSU delivers services to support student academics and meet special needs. Refer to the Career and Advising Center for additional information and services.

Each of the academic colleges has a Degree and Records Analyst (<https://www.ndsu.edu/registrar/office/liaisons/>) within the Office of Registration and Records who serves as a central point of contact to support and facilitate academic advising activities for faculty and professional advisers working with undergraduate (including pharmacy programs) student degree progress.

Credit By Examination

Students may demonstrate evidence of college-level achievement through the use of nationally standardized tests. Competency to take these examinations may have been gained through intensive preparation in high school, extensive reading in a particular field, or other types of formal or informal preparation. A student may not use credit by examination to repeat a course that has been previously completed at NDSU or another regionally accredited institution. Score reports must be sent directly to NDSU from the awarding agency/board. High school transcripts and student-issued grade reports are not considered official for purposes of awarding credit by examination. Credit by examination is not counted towards the university residence credit requirement for graduation.

Advanced Placement Examination (AP)

Students from high schools that participate in the Advanced Placement Program may earn credit through examinations provided by the College Entrance Examination Board (CEEB). The examinations are administered at the conclusion of a college-level course taught in participating high schools. AP Score Reports are sent to the colleges or universities designated on your exam answer sheet. Students who do not designate NDSU on their answer sheet may contact AP Services (see below) to have scores sent to NDSU. The code for NDSU is **6474**.

In accordance with North Dakota University System policy, a minimum score of three is required to receive credit for Advanced Placement (AP) examinations. If NDSU does not have an equivalent course, free elective credit may be awarded. Credit earned through AP is not residence credit and may not be used to satisfy residence-credit requirements for graduation. A listing of AP exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
Art-History	3	ART 210 & ART 211	6	A & A
Biology	3	BIOL 111 & BIOL 100L	4	S/L & S/L
Biology	4	BIOL 150, BIOL 150L, BIOL 151, & BIOL 151L	8	S/L, S/L, S/L, & S/L
Calculus AB	3	MATH 165	4	R
Calculus BC	3	MATH 165 & MATH 166	8	R & R

Chemistry	3	Free Elective (CHEM 1XX)*	4	S/L
Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, & CHEM 122L	8	S/L, S/L, S/L, & S/L
Chinese Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Comparative Government & Politics	3	POLS 225	3	B
Computer Science A	3	CSCI 160	4	S
Computer Science AB	3	CSCI 160 & CSCI 161	8	S & S
Computer Science Principles	4	CSCI 159	3	R
English Language & Composition	3	ENGL 110 (or ENGL 112)	3	C
English Literature & Composition	3	ENGL 220	3	A/D
English Literature & Composition	4	ENGL 110 & ENGL 220	6	C & A/D
Environmental Science	3	BIOL 124 & BIOL 100L	4	S/G & S/L
European History	3	HIST 101 & HIST 102	6	A & A
French Language & Culture	3	FREN 101 & FREN 102	8	A/D & A/G
German Language	3	GERM 101 & GERM 102	8	A/D & A/G
Human Geography	3	GEOG 151	3	B/G
Italian Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Japanese Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	A/D
Latin	3	Free Elective (TRANSFR 1XX)*	3	A/D
Latin Literature	3	Free Elective (TRANSFR 1XX)	8	A
Macroeconomics	3	ECON 202	3	B/G
Microeconomics	3	ECON 201	3	B/G
Music Theory	3	Free Elective (MUSC 1XX)*	6	A
Physics I: Algebra-Based	3	Free Elective (PHYS 1XX)*	4	S/L
Physics I: Algebra-Based	4	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics II: Algebra-Based	4	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	3	PHYS 212 & PHYS 212L	4	S/L & S/L
Physics C - Electricity & Magnetism	4	PHYS 252 & PHYS 252L	5	S/L & S/L
Physics C - Mechanics	3	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics C - Mechanics	4	PHYS 251 & PHYS 251L	5	S/L & S/L
Psychology	3	PSYC 111	3	B
Research	3	Free Elective (TRANSFR 1XX)	3	
Seminar	3	Free Elective (TRANSFR 1XX)	3	
Spanish Language	3	SPAN 101 & SPAN 102	8	A/D & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	A
Statistics	3	Free Elective (STAT 1XX)*	3	R
Statistics	4	STAT 330	3	R
Studio Art-2D Design Portfolio	3	ART 122	3	A
Studio Art-3D Design Portfolio	3	ART 124	3	A
Studio Art-Drawing Portfolio	3	ART 130 & ART 230	6	A & A
U.S. Government & Politics	3	POLS 115	3	B
U.S. History	3	HIST 103 & HIST 104	6	A & A
World History	3	Free Elective (HIST 1XX)*	6	A

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (<https://www.ndsu.edu/registrar/academics/gened/>) for more information on core NDSU courses.

For general information or to order AP score reports contact:

Phone: (609) 771-7300 or (888) 225-5427 (toll-free in the U.S. and Canada)
 Automated score report request line: (888) 308-0013 (toll-free in the U.S. and Canada)
 Email: apexams@info.collegeboard.org
 Web site: www.collegeboard.org (<https://www.collegeboard.org>)

Questions? Contact the NDSU Office of Registration and Records (<https://www.ndsu.edu/registrar/contact/>) at 701-231-7981

College Level Examination Program (CLEP)

CLEP is a national testing program sponsored by the College Entrance Examination Board (CEEB).

According to North Dakota University System policy, a minimum score of 50 is required to receive credit for CLEP subject examinations. If NDSU does not have an equivalent course, free elective credit may be awarded.

The following CLEP policies apply at NDSU

1. The examination should be taken prior to enrollment in the equivalent or more advanced college-level course.
2. Scores from an examination may not be used to establish credit for a course previously taken and failed or for a course in which the student is currently enrolled.
3. Three months must elapse before an examination may be repeated.
4. Credit earned through CLEP is not residence credit and may not be used to satisfy residence-credit requirements for graduation.

CLEP Examinations

A listing of CLEP exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
American Government	50	POLS 115	3	B
American Literature	50	ENGL 317 & ENGL 262	6	A & A
Analyzing & Interpreting Literature	50	ENGL 272 & Free Elective (ENGL 1XX)*	6	
Biology	50	BIOL 150 & BIOL 150L	4	S/L & S/L
Calculus	50	MATH 146	4	R
Chemistry	50	CHEM 121 & CHEM 121L	4	S/L & S/L
College Algebra	50	MATH 103	3	R
College Composition	50	ENGL 110	3	C
College Composition Modular	50	ENGL 110	3	C
College Mathematics	50	Free Elective (MATH 1XX)*	3	
English Literature	50	ENGL 251 & ENGL 252	6	A & A
Financial Accounting	50	ACCT 200	3	
French Language Level I	50	FREN 101	4	A/D

French Language Level II	59	FREN 101 & FREN 102	8	A/D & A/G
German Language Level I	50	GERM 101	4	A/D
German Language Level II	60	GERM 101 & GERM 102	8	A/D & A/G
History of the United States I	50	HIST 103	3	A
History of the United States II	50	HIST 104	3	A
Human Growth & Development	50	PSYC 250	3	B
Humanities	50	Free Elective (HUM 1XX)*	3	
Information Systems	50	Free Elective (CSCI 1XX)*	2	S
Introduction to Educational Psychology	50	Free Elective (TRNSFR 1XX)*	3	B
Introduction to Business Law	50	Free Elective (TRNSFR 1XX)*	3	
Introduction to Psychology	50	PSYC 111	3	B
Introduction to Sociology	50	SOC 110	3	B
Natural Sciences	50	Free Elective (TRNSFR 1XX)*	3	
Pre-Calculus	50	MATH 107	3	R
Principles of Macroeconomics	50	ECON 202	3	B/G
Principles of Management	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Marketing	50	Free Elective (TRNSFR 1XX)*	3	
Principles of Microeconomics	50	ECON 201	3	B/G
Social Sciences & History	50	Free Elective (TRNSFR 1XX)*	3	
Spanish Language Level I	50	SPAN 101	4	A/D
Spanish Language Level II	63	SPAN 101 & SPAN 102	8	A/D & A/G
Western Civilization I: Ancient Near East to 1648	50	HIST 101	3	A
Western Civilization II: 1648 to the Present	50	HIST 102	3	A

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (<https://www.ndsu.edu/registrar/academics/gened/>) for more information on core NDSU courses.

For general information, additional test center locations, or to order transcripts contact:

Phone: (800) 257-9558

Email: clep@collegeboard.org

Web site: www.collegeboard.org (<https://www.collegeboard.org/>)

*Please contact the NDSU Office Registration and Records (<https://www.ndsu.edu/registrar/contact/>) at 701-231-7981 for more information on credit awarded for these tests.

DSST Examinations

NDSU recognizes the DSST (Dantes) examination, which was originally designed for the military as a way to provide individuals an opportunity to obtain college level credit for what they have learned in nontraditional ways. Now available for civilian use, the DSST Test Control Officer (TCO) administers the exams on more than 560 military installations and official DSST test centers. The main users of the exams include adult education programs, U.S. Department of Defense, and two- and four-year colleges and universities. NDSU's DSST location site code is: DSST-9366.

In accordance with North Dakota University System policy, students must receive a minimum score on the examinations to qualify for possible awarding of credit and advanced placement, which is determined by the appropriate academic department on campus. If NDSU does not have an equivalent course, elective credit may be awarded. Credit earned through DSST may not be used to satisfy residence credit requirement for graduation. A listing of DSST exams and current NDSU equivalent courses are listed below.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
A History of the Vietnam War	44	Free Elective (HIST 1XX)*	3	
Art of the Western World	48	ART 111	3	A
Astronomy	48	PHYS 110	3	S
Business Law	44	Free Elective (TRNSFR 1XX)*	3	
Business Mathematics	400	Free Elective (TRNSFR 1XX)*	3	
Civil War & Reconstruction	47	Free Elective (HIST 1XX)*	3	
Contemporary Western Europe	45	HIST 102	3	A
Criminal Justice	400	CJ 201	3	
Environment & Humanities	46	Free Elective (TRNSFR 1XX)*	3	
Environmental Science	400	BIOL 124	3	S/G
Ethics in America	400	PHIL 210	3	
Foundations of Education	46	Free Elective (TRNSFR 1XX)*	3	
Fundamentals of College Algebra	400	MATH 103	3	R
Fundamentals of Counseling	45	Free Elective (TRNSFR 1XX)*	3	
General Anthropology	47	ANTH 111	3	B/D
Here's to Your Health	400	HNES 217	3	W
Human Resource Management	46	Free Elective (TRNSFR 1XX)*	3	
Human/Cultural Geography	47	GEOG 151	3	B/G
Intro to the Modern Middle East	47	Free Elective (TRNSFR 1XX)*	3	
Intro to Business	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Computing	400	Free Elective (TRNSFR 1XX)*	3	
Intro to Law Enforcement	45	Free Elective (TRNSFR 1XX)*	3	
Lifespan Development Psychology	46	PSYC 250	3	B
Management Information Systems	400	Free Elective (TRNSFR 1XX)*	3	
Money & Banking	48	Free Elective (TRNSFR 1XX)*	3	
Organizational Behavior	48	Free Elective (TRNSFR 1XX)*	3	
Personal Finance	400	Free Elective (TRNSFR 1XX)*	3	
Physical Geology	46	Free Elective (GEOL 1XX)*	3	S/G
Principles of Finance	400	Free Elective (TRNSFR 1XX)*	3	
Principles of Financial Accounting	49	ACCT 200	3	
Principles of Statistics	48/400	Free Elective (STAT 1XX)*	3	
Principles of Supervision	400	Free Elective (TRNSFR 1XX)*	3	
Rise and Fall of Soviet Union	45	Free Elective (HIST 1XX)*	3	
Substance Abuse	400	PSYC 212	3	B

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (<https://www.ndsu.edu/registrar/academics/gened/>) for more information on core NDSU courses.

Additional Information:

For more information on DSST exams and to locate a test center, go to www.getcollegecredit.com (<http://www.getcollegecredit.com/>)

International Baccalaureate (IB)

NDSU recognizes the International Baccalaureate program, offered at many high schools in the United States and abroad, which allows students to take examinations for credit. The examinations are offered at the standard (SL) and higher (HL) levels. **However, according to state policy, NDSU will only grant credit for applicable HL examinations.**

In accordance with North Dakota University System policy, students must receive a predetermined minimum score on higher-level (HL) examinations to qualify for possible awarding of credit and advanced placement, which is determined by the appropriate academic department on campus. Credit earned through IB may not be used to satisfy residence-credit requirements for graduation. Scores received in IB examinations not included in the table below may be considered for credits. Contact the Office of Registration and Records (<https://www.ndsu.edu/registrar/contact/>) for information.

Examination	Score	Equivalent NDSU Course	Credit Hours	Gen Ed Category
HL Biology	4	BIOL 150, BIOL 150L, BIOL 151, BIOL 151L	8	S/L, S/L, S/L, S/L
HL Business Management	4	Free Elective (TRNSFR 1XX)*	3	
HL Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, CHEM 122L	8	S/L, S/L, S/L, S/L
HL Economics	4	ECON 105	3	S/G
HL Economics	5	ECON 201, ECON 202	6	S/G, S/G
HL English	4	ENGL 220	3	A
HL English A Lang and Lit	4	ENGL 110, ENGL 220	6	C, A/D
HL French B	5	FREN 101, FREN 102, FREN 201	11	A/D, A/G, A/D
HL Geography	4	GEOG 161	3	G
HL German B	5	GERM 101, GERM 102, GERM 201	11	A/D, A/G, A/D
HL History of Africa and the Middle East	4	Free Elective (HIST 1XX)*	3	
HL History (Africa)	4	Free Elective (HIST 1XX)*	3	
HL History (Americas)	4	HIST 103, HIST 104	6	A, A
HL History (Asia)	4	Free Elective (HIST 1XX)*	3	
HL History (Europe)	4	HIST 102	3	A
HL History (Islamic)	4	Free Elective (HIST 1XX)*	3	
HL History (Middle East)	4	Free Elective (HIST 1XX)*	3	
HL Literature & Performance	4	Free Elective (COMM 1XX)	3	
HL Mathematics	4	MATH 103, MATH 105	6	R, R
HL Physics	5	Free Elective (PHYS 1XX)*	4	

HL Psychology	4	PSYC 111	3	B
HL Spanish B	5	SPAN 101, SPAN 102, SPAN 201	11	A/D, A/G, A/D

* Credit received applies toward degree elective credit

General Education Categories:

A	Humanities & Fine Arts
B	Social & Behavioral Science
C	Communication
D	Cultural Diversity
F	First Year Experience
G	Global Perspectives
L	Laboratory Experience
R	Quantitative Reasoning
S	Science & Technology
W	Wellness

See General Education Requirements (<https://www.ndsu.edu/registrar/academics/gened/>) for more information on core NDSU courses.

To order official transcripts, please contact:

Web site: www.ibo.org/ (<https://www.ibo.org/>)
 Phone: (301) 202-3025
 Email: ibid@ibo.org

Course Challenge

A student who is currently registered may seek credit by challenging a course. A course challenge usually consists of a special comprehensive examination; however, additional types of performance may be required for some courses. A course challenge is only permitted for courses in which the student has no previous record (prior registrations allowable if course was dropped by the No Record Drop deadline in a given term). Further, credits earned by course challenge may not satisfy requirements toward a graduate degree.

Procedures for pursuing a course challenge include the following

1. Obtain a Petition for Course Challenge Form (<https://www.ndsu.edu/registrar/forms/challenge/>), available online.
2. Obtain approval from the academic adviser, the instructor of the course, and the chair of the department offering the course. Clarify expectations of the challenge, e.g., examination only or examination plus other performance. Based on the nature of the course and content area, some courses may not be approved for challenge by the department.
3. Pay the course challenge fee at the Customer Account Services (<https://www.ndsu.edu/cas/>), 302 Ceres Hall, after receiving approval for the challenge (50% of the regular credit tuition charge; not subject to tuition cap).
4. Arrange a mutually convenient date and time for the challenge with the instructor or department.
5. Upon receipt of the signed Petition for Course Challenge form from the department, courses and credits successfully challenged are listed on the student's academic transcript with a passing (P) grade. Unsuccessful challenges are not recorded.

Project Lead the Way (PLTW) Eligibility:

Secondary school students successfully completing Project Lead the Way (PLTW) courses may apply for transcribed college credit from North Dakota State University. The student will receive 3 semester credits per course, subject to the following conditions:

- The high school must be certified by PLTW.
- All requirements for the PLTW course must be satisfied, and the student must achieve an average of 85% or better for the course
- The PLTW End of Course Assessment must be taken and passed with a stanine* score of 6.
- Correct payment amount and completed application must be post marked by the deadline. Any application post marked after the deadline will not be processed and will be returned.

*This assessment (Administered by PLTW) is based on a norm-reference stanine scores which ranges from one (1) to nine (9) with one (1) being the lowest possible score and nine (9) being the highest possible score.

NDSU will accept transcribed credit for PLTW courses from other affiliate universities with equivalent credit requirements. Up to 6 credits may be used as general electives towards a degree at the NDSU. Possible substitution of PLTW credits for meeting specific programmatic requirements at the University is at the discretion of the individual academic programs. Currently, at NDSU, PLTW courses do not have specific program equivalents.

The PLTW courses for which NDSU credit may be received are the following:

- ENGR: 120 PLTW IED: Introduction to Engineering Design
- ENGR: 121 PLTW POE: Principles of Engineering
- ENGR: 122 PLTW DE: Digital Electronics
- ENGR: 123 PLTW CEA: Overview of Civil Engineering and Architecture
- ENGR: 124 PLTW ES: Biotechnical Engineering or Environmental Engineering
- ENGR: 125 PLTW CIM: Computer Integrated Manufacturing
- ENGR: 126 PLTW AE: Aerospace Engineering
- ENGR: 128 PLTW CSE: Computer Science and Software Engineering

Once approved students see a Pass (P) appear on the NDSU transcript.

For additional information on PLTW, contact NDSU's College of Engineering (<https://www.ndsu.edu/coe/>) or Office of Admission (<https://www.ndsu.edu/admission/>).

Project Lead The Way is a United States 501 non-profit organization that develops STEM curricula for use by elementary, middle, and high schools.

English and Mathematics Placement

In accordance with North Dakota University System Policy and Procedure 402.1.2 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/EVgFI_RybqBEiUwTPXzcOaQBUWYDTS1Pj6jzSHLPTYT7tg/) students are placed into Math and English courses based on qualifying exam scores. The intent is to appropriately place students into courses that are both challenging and for which they are adequately prepared.

English Placement for U.S. Students, Canadian Students, and U.S. Permanent Residents

- All students are required to successfully earn credit for ENGL 110 and 120 or equivalent as part of the NDSU general education requirements.
- For students who have multiple placement exam scores, the highest placement may be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: NDSU Disability Services (<https://www.ndsu.edu/disabilityservices/>); Dept. 2860; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Students who have not submitted any of the approved English placement examinations are required to take the NDSU English Placement Survey. Questions about the NDSU English Placement Survey can be directed to NDSU One Stop (<https://www.ndsu.edu/onestop/>).
- Students who have submitted placement scores, may elect to take the NDSU English Placement Survey to attempt to place into a higher English course. ENGL 120 is the highest placement attainable.
- Students who place into ASC 86 or ASC 87 developmental English courses are required to enroll through the collaborative student registration (<https://currbulletin.ndsu.edu/academic-policies/registration/#collaborativeregistrationtext>) process delivered by North Dakota State College of Science (<https://www.ndscs.edu/current-students/student-success/test-center/>) (NDSCS). Course textbooks for ASC 87 may be purchased through the NDSU bookstore (<http://www.ndsubookstore.com/>).
- Upon completion of ENGL 120 with a 'C' grade or higher, students will be awarded placement credit (3) for ENGL 110.
- Students who transfer ENGL 120 to NDSU will be awarded placement credit (3) for ENGL 110 after successfully completing their upper division writing course with a grade of 'C' or higher.
- Students who transfer in ENGL 110 with a non-passing grade, may elect to take the NDSU English Placement Survey.
- Students with a MELAB score should contact the IELP coordinator (http://www.ndsu.edu/modernlanguages/departments_directory/) for information on English placement.

NDSU English Placement Survey Scoring Guide

Score Range 1-8: ASC 087

Score Range 9-10: ASC 087 OR English 112 (choice; English 110 if 112 not offered)

Score Range 11-12: ASC 087 OR English 110 (choice)

Score Range 13-16: English 112 (110 if 112 not offered)

Score Range 17-20: English 110

Score Range 21-24: English 112 or 122 (choice; English 110 or 120 if not offered)

Score Range 25-28: English 110 or 120 (choice)

Score Range 29-34: English 122 (120 if 122 not offered)

Score Range 35-40: English 120

Score Range 41-42: English 122 OR Course Challenge (choice; English 120 if 122 not offered)

Score Range 43-44: English 120 OR Course Challenge (choice)

The table below lists exam scores and corresponding English course placement at NDSU:

English ACT Subtest Score	SAT Writing	ACT Aspire	Smarter Balanced 11/12 Grade(ELA)	Accuplacer WritePlacer Test Score	Accuplacer Next-Generation Writing	MyFoundationsLa Pearson (CREAM CLEM & Others)	NDSU Course Placement
13 or lower	Evidence Based Reading & Writing 470 or lower	425 or lower	2 or lower	4 or lower	249 or lower	69% or lower	English Placement Survey
14-17	Evidence-Based Reading & Writing: 480	426 or higher	3 or higher	5	250-255	70% or higher	ENGL 110: College Composition I
18 or higher	Evidence-Based Reading & Writing: 480	-	-	6-8	256 or higher	-	ENGL 120: College Composition II

English Placement for International Students

- International students living in a country where the primary language is English are not required to present test scores for placement. Even if they have test scores, they should take the placement survey on Blackboard to determine which English course to take.
- Students who are required to begin in LANG 109 must successfully complete the course with a 'C' grade or higher before they may enroll in ENGL 112 or equivalent.
- ENGL 112 and 122 are special sections of College Composition equivalent to ENGL 110 and 120, respectively. International students who are multilingual are encouraged to enroll in ENGL 112 or 122, but they may enroll in ENGL 110 or 120 if ENGL 112 or 122 is not available.
- All degree-seeking students are required to successfully earn credit for ENGL 112 and 122 (or 110 and 120) or equivalent as part of the NDSU general education requirements.
- For students who have multiple exam scores, the highest placement may be used. International students who meet the threshold for ENGL 112 based on exam scores (see table below) should take the English placement survey in Blackboard to determine their course placement (ENGL 112 or 122, or equivalent).
- Students who are advised to enroll in ENGL 122, will be awarded placement credit (3) for ENGL 112 upon completion of ENGL 122 with a 'C' grade or higher.
- For students who have multiple exam scores, the highest placement may be used.

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112: ESL College Composition I	ENGL 122: ESL English Composition II
TOEFL iBT	70 or lower	71 or higher	English Placement Survey
IELTS (Overall)	5.5 or lower	6.0 or higher	English Placement Survey
Duolingo English Exam	99 or lower	100 or higher	English Placement Survey

SAT Evidence-Based Reading & Writing	400 or lower	410 or higher	English Placement Survey
ACT English Subscore	13 or lower	14 or higher	English Placement Survey

NDSU Math Placement Procedures

A variety of approved placement examinations are used (see table below) to determine placement of students into entry-level math courses. The following guidelines apply to math placement practices:

- For students who have scores from multiple exams, the highest placement will be used.
- Eligible students with disabilities may seek reasonable accommodations to take the placement test. Please submit disability documentation to NDSU Disability Services at least two weeks prior to the time in which the accommodations are needed. Documentation will be reviewed and students will be notified if additional documentation is needed to make an eligibility decision. Please submit the request and documentation to: NDSU Disability Services (<https://www.ndsu.edu/disabilityservices/>); Dept. 2860; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Current, incoming or returning NDSU students who do not have prior college-level mathematics *OR* have not taken an approved placement examination must take the NDSU Pearson Placement exam to determine course placement.
- Students who meet the minimum score requirement of any approved placement examination may elect to take the NDSU Pearson Placement exam to attempt to place into a course above MATH 103 or MATH 104. Please note that the NDSU Pearson Placement exam should be completed prior to a student enrolling in either MATH 98 or MATH 103/104. If the Pearson Placement exam is taken after enrollment in MATH 98 or MATH 103/104, the student must drop this course either on or before the no-record drop deadline for the Pearson Placement to take effect.
- Students that do not meet the minimum score requirement on any approved placement examination will place into Math 98, however, students may elect to take the NDSU Pearson Placement exam offered through NDSU to attempt to place into a course above MATH 98.
- Students have the option to retake the NDSU Pearson Placement exam one time and must be completed before the last day to add classes in Campus Connection.
- Questions about the NDSU Pearson Placement exam can be directed to NDSU One Stop (<https://www.ndsu.edu/onestop/>).

Exam scores and corresponding course placement possibilities are listed in the table below:

The table below lists NDSU approved placement examinations and minimum exam scores for placement into MATH 103 or Math 104:		
Test	Test Component	Minimum Score
ACT	Math Subtest	21
SAT	MATH	530
SAT (prior to 2/05/2016)	Math + Reading	990
Accuplacer Next-Generation	Quantitative Reasoning, Algebra, and Statistics	255
Accuplacer Next-Generation	Advanced Algebra Functions	237
ACT Aspire	Math Subtest	431
ALEKS	Mathematics PPL	46
MyFoundationsLab Pearson (CREAM, CLEM & Others)	Math	70%
EdReady (NROC)	Math Placement	75
MAA Maplesoft	Algebra	12
Smarter Balanced	Grade 11-12 Math	3
The Table below lists NDSU Pearson Placement exam scores and corresponding Math course placement at NDSU:		
Pearson	Course Placement	
Intermediate Algebra < 70%	Math 098	
Intermediate Algebra ≥ 70%	Math 103 or Math 104	
Algebra < 60%	Math 103 or Math 104	
Algebra ≥ 60% AND Trigonometry < 65%	Math 105 or Math 144* or Math 146	
Algebra ≥ 65% AND Trigonometry 40%-64.9%	Math 165 with Math 105	
Algebra ≥ 65% AND Trigonometry ≥ 65%	Math 165	

Pearson	Course Placement
Intermediate Algebra < 70%	Math 098
Intermediate Algebra ≥ 70%	Math 103 or Math 104
Algebra < 60%	Math 103 or Math 104
Algebra ≥ 60% AND Trigonometry < 65%	Math 105 or Math 144* or Math 146
Algebra ≥ 65% AND Trigonometry 40%-64.9%	Math 165 with Math 105
Algebra ≥ 65% AND Trigonometry ≥ 65%	Math 165

*MATH 144, "Mathematics for Business", is only available for College of Business majors.

Students with College Transfer Coursework or Credit by Examination Placement

Students with prior college coursework, Advance Placement (AP) or other credit-by-examination (CLEP, IB, DSST) will follow NDSU's Credit by Examination (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/credit-by-examination/>) guidelines for placement into mathematics and English coursework.

Sequence of NDSU math courses as a reference or guide:

START: MATH 98* > MATH 103 > MATH 105 > MATH 165 > MATH 166 or

MATH 98* > MATH 103 > MATH 146 > Math 147 or

MATH 98* > MATH 104

START: Math Placement Test > MATH 107 > MATH 165 > MATH 166

*Students who begin in Math 98 must successfully complete the course with a 'C' grade or higher before they may continue to Math 103 or 104.

General Education

The purpose of general education at NDSU is to ensure that students acquire knowledge, perspectives, and skills basic to a university education. The program is designed so that students will be able to adapt to and anticipate changes in their profession and in society. Students also will be able to integrate and use the knowledge and perspectives they have gained to live productive, intellectually rewarding and meaningful lives.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

General Education Category Descriptions

The following descriptions are elaborations of the general education categories approved by the Faculty Senate.

- **Communication (C)** is the clear, precise, and purposeful exchange of information in a variety of contexts, using either written or oral means.
- **Cultural diversity (D)** focuses on the social, personal, and interpersonal effects of variety and differences among cultures.
- **Fine arts (A)**, as an integral component of the humanities, promote the appreciation of aesthetics and the expression of creativity.
- **Global perspectives (G)** focus on analysis of worldwide issues illustrating the interdependence of the world and its people.
- **Humanities (A)** systematically explore cultural and intellectual forces shaping events, individual expression, and social values.
- **Quantitative reasoning (R)** is an organized set of quantitative methods used to solve problems or extend knowledge. Quantitative methods are a set of principles and procedures that could be used to manipulate numerical data.
- **Science (S)** is an organized body of knowledge, including principles and procedures based on scientific methods, used to explain physical or biological phenomena.

- **Social and behavioral sciences (B)** use scientific methods to analyze the behaviors, structures, and processes of individuals and groups.
- **Wellness (W)** is a dynamic and integrative process of becoming aware of healthy lifestyles, of learning to make informed choices, and of developing a balanced approach to living.

General Education Program Assessment

General education assessment has three basic purposes:

1. To improve student learning and development by identifying the intended student outcomes for the program.
2. To provide feedback on the progress toward the intended student outcomes.
3. To use the feedback to modify aspects of the program to ensure that the outcomes are being achieved and that student learning is improved.

Assessment activities are valued at NDSU and include the participation of students. Results will not be used to penalize students or faculty. Student performance on assessment of the general education program will not become part of the transcript.

General Education Transfer

Students transferring lower-division general education credits within the North Dakota University System need to consult with advisers in their academic programs at NDSU for two reasons. First, degree requirements of individual programs and colleges at NDSU may exceed the university-wide general education requirements. Second, meeting the university-wide lower-division general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU. See also the NDUS GERTA Agreement.

NDSU Global Seminar and Global Practicum Courses

Global Practicum: Study Abroad [(Prefix) 292, 392, 492, 692] A student who studies abroad for one or more semesters, and who successfully completes a minimum of three credits eligible for transfer back to NDSU, may qualify for either Cultural Diversity or Global Perspectives. Completing six or more study abroad credits may qualify for both Cultural Diversity and Global Perspectives categories. A student must arrange to have an official transcript sent to NDSU from the study abroad institution for official evaluation and credit determination. The student must complete a Student Appeal for Exception to General Education Requirements (<https://www.ndsu.edu/fileadmin/registrar/forms/genedappeal.pdf>) for this consideration.

Global Seminar [(Prefix) 179, 279, 379, 479, 679] Global Seminar experiences *do not* automatically qualify for NDSU general education. An NDSU global seminar instructor must apply for approval in an appropriate general education category *before* the course is open for student enrollment and well in advance of seminar departure. Approval requires the instructor to submit a course syllabus and a one-page rationale to the University General Education committee addressing how the seminar experience aligns the course learning outcomes with the general education learning outcomes for the category being sought. Approval is a one-time event and is not extended to additional semesters. Only students who enroll in the class and complete the experience are eligible for general education.

General Education Learning Outcomes

The intended learning outcomes resulting from the various general education categories include the following:

Communication (C) - students will

- effectively communicate analysis, knowledge, understanding, expression and/or conclusions in a range of contexts
- skillfully use high-quality, credible, relevant sources
- demonstrate appropriate conventions in a variety of communication situations

Quantitative Reasoning (R) - student will

- apply quantitative and qualitative methods to collect and analyze data, in order to:
 - explain the nature of evidence used for analysis
 - evaluate the assumptions, evidence, and logic of competing views and explanations

Science & Technology (S)

Technology Learning Outcome- students will

- understand, use, and apply technology to demonstrate creativity and solve problems
- identify the social, aesthetic, and ethical implications of technological decisions
- analyze how technology shapes, limits, and augments our experiences and understandings

Natural and Physical Sciences Learning Outcome - students will

- analyze components and dynamics of natural and physical worlds
- develop models to explain phenomena within the natural and physical worlds
- apply methods of scientific inquiry to enhance their understanding of the natural and physical world

Humanities & Fine Arts (A) - students will

- identify the nature and impact of aesthetic, creative, or cultural activities on human experience
- analyze the components and dynamics of human societies in their artistic, cultural, and historical contexts

Social & Behavioral Sciences (B) - students will

- analyze the interplay of self and society, particularly how social structures shape human experiences and how humans shape social structures
- apply theories or research methods to understand human events, identities, artifacts, or social structures
- Examine their own values, biases, and conclusions within larger social or theoretical contexts

Social & Behavioral Sciences - Wellness (W) - students will

- examine how social ecological contexts relate to their personal wellness values, biases, and conclusions
- articulate how their personal, professional, or civic goals reflect their core wellness values
- explore, identify and evaluate sources of information related to personal wellness

Cultural Diversity (D) - students will

- identify how diverse societies shape individual experiences, expressions and identities
- identify how diversity influences cultural values

Global Perspectives (G) - students will

- apply theories or research methods to develop strategies and solutions that address global challenges
- identify potential benefits and explore the implications of global citizenship
- evaluate global phenomena using perspectives, attitudes and beliefs of communities with cultural backgrounds different from their own

General Education Administrative Policies

1. General education courses may be used to satisfy requirements for both general education requirements and the major, minor, and program emphases, where applicable.
2. Departments or colleges may preclude their students from double counting general education courses with major courses.
3. Except for courses that meet the cultural diversity or global perspectives requirements, no course can fulfill the requirements for more than one general education category.
4. General education requirements can be met through credit by exam, departmental examinations, or equivalents.
5. General education requirements can be met by successful completion of a course for which an approved general education course in the same department is a prerequisite or by successful completion of an advanced course in the same department with comparable course content.
6. Except for courses offered only on a pass/fail basis, no courses taken to meet the general education requirements may be taken for pass/fail grades. (Exception for Spring 2020: Students were allowed to complete general education requirements with a pass grade.)
7. The general education minimum requirements apply to all baccalaureate degree programs.
8. Transfer students who have only partially fulfilled general education category requirements by transfer-approved courses must complete the requirements in approved courses within the NDSU deficient categories. No category credit requirement may be deficient by more than a partial semester credit. However, in the communication category, if the transfer course(s) have been evaluated as equivalent to ENGL 110 College Composition I, ENGL 120 College Composition II, and COMM 110 Fundamentals of Public Speaking and total no less than eight semester credits, the lower-division category requirement has been met.
9. Students may receive placement credit for ENGL 110 College Composition I based on a minimum English ACT score (or SAT equivalent) and satisfactory performance (grade of 'C' or better) in ENGL 120 College Composition II or equivalent.
10. A student who has completed an associate of arts or an associate of science degree in the United States or Canada at a regionally accredited institution and who transfers to NDSU or who pursues a second baccalaureate degree at NDSU is considered to have completed his or her lower-division general education requirements at NDSU. Transfer student coursework from outside the United States and Canada will be evaluated on a course-by-course basis.
11. General education courses at other accredited institutions, which do not have equivalent courses or general education status at NDSU, may be accepted in transfer as part of the general education requirements at NDSU.

12. All general education course syllabi and course web sites must identify the course as having been approved for meeting general education requirements and include the general education outcomes for which each course is approved. (See Syllabus Requirements (<https://www.ndsu.edu/facultysenate/acadaffairs/syllabi/>))
13. Students who have completed basic military training (which is the commitment for enlistment) will receive a waiver for the Wellness category. Military record documentation is required for the waiver; documentation is to be submitted to the Office of Registration and Records with a completed Appeal for Exception to General Education Requirements form. The waiver for the training will not lead to course credit, and all other minimum graduation requirements apply.
14. Students must complete at least four credits of natural and physical sciences in the Science and Technology category. Also in this category, a student must complete a one-credit lab taken as a co-requisite with an approved general education science and technology lecture course, unless the approved science and technology course has an embedded lab experience equivalent to one-credit (ex. CHEM 117 & CHEM 117L; PLSC 110).

General Education Courses

The following is representative of the courses approved in each general education category for the specific catalog year. The general education component requires a minimum of 39 total credits with a minimum credit requirement in each of the seven categories. Cultural diversity and global perspectives may be satisfied by completing courses in another category.

Category C: Communications - 12 credits

- 3 of the 12 credits at the upper-level (300-400):

Code	Title	Credits
ENGL 110 or ENGL 112	College Composition I Multilingual College Composition I	3
ENGL 120 or ENGL 121 or ENGL 122	College Composition II Honors Composition II Multilingual College Composition II	3
COMM 110 or COMM 111	Fundamentals of Public Speaking Honors Public Speaking	3
ECON 356	History of Economic Thought	3
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 324	Writing in the Sciences	3
ENGL 325	Writing in the Health Professions	3
ENGL 326	Writing in the Design Professions	3
ENGL 357	Visual Culture and Language	3
ENGL 358	Writing in the Humanities and Social Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
FREN 360	Studies in Language and Style	3
HIST 390	Historical Research and Writing	3
MICR 354	Scientific Writing	3
PHIL 450	Metaphysics	3
PHIL 451	Epistemology	3
PHRM 324	Writing and Professionalization in Pharmacy	3
SPAN 401	Advanced Spanish Grammar and Writing	3

Category R: Quantitative Reasoning - 3 credits

Code	Title	Credits
CSCI 122	Visual BASIC	3
CSCI 159	Computer Science Problem Solving	3
EMGT 445	Understanding Vulnerable Populations in Disasters	3
MATH 104	Finite Mathematics	3
MATH 146	Applied Calculus I	4
MATH 165	Calculus I	4

PHIL 257	Traditional Logic	3
STAT 330	Introductory Statistics	3

CATEGORY S: Science & Technology - 10 Credits

- At least four credits must be in natural or physical sciences.
- A one-credit lab must be taken as a co-requisite with a general education science/technology course unless the course includes an embedded lab experience equivalent to a one-credit course.

Natural Science (Sn):

Code	Title	Credits
AGRI 115	Wonders of Weather	3
BIOL 100L	Non-Majors Biology Lab *	1
BIOL 111	Concepts of Biology	3
BIOL 124	Environmental Science	3
BIOL 126	Human Biology	3
BIOL 220	Human Anatomy and Physiology I	3
BIOL 220L	Human Anatomy and Physiology I Laboratory	1
BIOL 315	Genetics	3
or PLSC 315	Genetics	
BIOL 315L	Genetics Laboratory	1
or PLSC 315L	Genetics Laboratory	
CFS 210	Introduction to Food Science and Technology	3
GEOL 201	The Geology of Climate Change and Energy	3
HON 342	Colloquium in the Sciences	3
MICR 202	Introductory Microbiology	2
MICR 202L	Introductory Microbiology Lab	1
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
PLSC 111	Genetics and You	2
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 217	Introduction to Meteorology & Climatology	3

* Beginning Fall 2020, BIOL 100L replaces the previously offered BIOL 111L, BIOL 124L and BIOL 126L as the co-requisite lab for the lecture classes BIOL 111, BIOL 124, and BIOL 126. BIOL 100L is also considered the repeated course equivalent for any of these three lab courses.

Physical Science (Sp):

Code	Title	Credits
CHEM 117	Chemical Concepts and Applications	3
CHEM 117L	Chem Concepts and Applications Lab	1
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 107L	Geology of Red River Valley <small>May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.</small>	1
GEOL 219	Oceanography	3
PHYS 110	Introductory Astronomy	3
PHYS 110L	Introductory Astronomy Lab	1

PHYS 120	Fundamentals of Physics	3
PHYS 120L	Fundamentals of Physics Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Technology (St):

Code	Title	Credits
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	

CATEGORY A: Humanities & Fine Arts - 6 Credits

Code	Title	Credits
ADHM 310	History of Fashion	3
ADHM 315	History of Interiors I	3
ADHM 316	History of Interiors II	3
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History and Theory of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 130	Drawing I	3
ART 153	Design Thinking and Creative Strategy	3
ART 210	Art History I	3
ART 211	Art History II	3
ENGL 150	Being Human	3
ENGL 220	Introduction to Literature	3
ENGL 225	Introduction to Film	3
ENGL 229	Introduction to Creative Writing	3
ENGL 240	World Literature Masterpieces	3
ENGL 251	British Literature I	3
ENGL 252	British Literature II	3
ENGL 262	American Literature II	3
ENGL 330	Women's Writing	3
ENGL 333	Fantasy and Science Fiction	3
ENGL 335	Multicultural Writers	3
ENGL 336	Literature and The Environment	3
ENGL 340	19th Century American Fiction	3
ENGL 341	Contemporary American Fiction	3
ENGL 345	Themes in American Culture	3
ENGL 375	The Bible as Literature	3
ENGL 380	Shakespeare	3
ENGR 311	History of Technology in America	3
ENVD 101	Introduction to Environmental Design	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
FREN 201	Second-Year French I	3
FREN 202	Second-Year French II	3

FREN 220	French and Francophone Culture	3
FREN 340	The French-Speaking World	3
FREN 345	Women in French Literature	3
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 201	Second-Year German I	3
GERM 202	Second-Year German II	3
GERM 220	German Culture & Society	3
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 130	The American Presidency	3
HIST 135	Race in U.S. History	3
HIST 270	American Religious History	3
HIST 271	Introduction to Latin American History	3
HIST 320	History of Christianity	3
or RELS 320	History of Christianity	
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 151	Sapient Logic	3
HON 340	Colloquium in the Humanities	3
HON 386	World Literature: Imaginary Homelands	3
LA 321	History of Landscape Architecture	4
LANG 108	Studies in American Language and Culture	3
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
MUSC 379	Global Seminar	1-6
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3
PHIL 215	Contemporary Moral Issues	3
PHIL 216	Business Ethics	3
PHIL 225	Environmental Ethics	3
RELS 100	World Religions	3
RELS 220	Old Testament	3
RELS 230	New Testament	3
RELS 270	American Religious History	3
RELS 335	History of Judaism	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3
RELS 355	History of Global Islam	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
SPAN 202	Second-Year Spanish II	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 160	Storytelling	3
THEA 161	Acting I	3
THEA 280	World Theatre	3

TIPS 101	Introduction to Native American & Indigenous Studies	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY B: Social & Behavioral Sciences - 6 Credits

Code	Title	Credits
ADHM 141	Tourism and International Travel Management	3
ADHM 486	Dress and Human Behavior	3
ANTH 111	Introduction to Anthropology	3
ANSC 200	Introduction to Anthrozoology	3
ANTH 204	Archaeology and Prehistory	3
ANTH 205	Human Origins	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
BUSN 280	Introduction To Business	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 425	World Disasters	3
ENGR 312	Impact of Technology on Society	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HON 341	Colloquium in the Social Sciences	3
INTL 110	Introduction to International Studies	3
POLS 110	Introduction to Political Science	3
POLS 115	American Government	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
POLS 231	Law and Society	3
PSYC 111	Introduction to Psychology	3
PSYC 210	Human Sexuality	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212	Psychological Aspects of Drug Use and Abuse	3
PSYC/SOC 214	Social Interaction	3
PSYC 221	Psychology Applied to Work	3
PSYC 250	Developmental Psychology	3
PSYC 270	Abnormal Psychology	3
SOC 110	Introduction to Sociology	3
SOC 115	Social Problems	3
SOC 116	Global Social Problems	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3
WGS 370	Transnational/Global Women	3

CATEGORY W: Wellness - 2 Credits

- Required is a social/behavioral science course that integrates at least two areas of lifelong wellness: emotional well-being, nutrition, physical activity, and psychological development.

Code	Title	Credits
ECON 205	Market Values	3
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 217	Personal and Community Health	3
HNES 250	Nutrition Science	3
HON 251	Leadership Development	2
PH 101	Introduction to Public Health	3

CATEGORY D: Cultural Diversity

- This requirement may be met by 3 credits taken in any department as part of the 39 credits required for general education in a course approved for cultural diversity.

Code	Title	Credits
ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ANTH 111	Introduction to Anthropology	3
ANTH 204	Archaeology and Prehistory	3
ANTH 205	Human Origins	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
ART 110	Introduction to the Visual Arts	3
COMM 216	Intercultural Communication	3
EMGT 445	Understanding Vulnerable Populations in Disasters	3
ENGL 150	Being Human	3
ENGL 220	Introduction to Literature	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	Contemporary American Fiction	3
ENGL 345	Themes in American Culture	3
FREN 101	First-Year French I	4
FREN 201	Second-Year French I	3
FREN 220	French and Francophone Culture	3
FREN 340	The French-Speaking World	3
FREN 345	Women in French Literature	3
GERM 101	First-Year German I	4
GERM 201	Second-Year German I	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HIST 135	Race in U.S. History	3
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
HON 151	Sapien Logic	3
HON 386	World Literature: Imaginary Homelands	3
LANG 108	Studies in American Language and Culture	3
MUSC 108	Roots of American Popular Music	3
MUSC 379	Global Seminar	1-6
PH 101	Introduction to Public Health	3
PHIL 215	Contemporary Moral Issues	3
SOC 235	Cultural Diversity	3

SOC 412	Sociology of Gender	3
SPAN 101	First-Year Spanish I	4
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
TIPS 101	Introduction to Native American & Indigenous Studies	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY G: Global Perspectives

- This requirement may be met by 3 credits taken in any department as part of the 39 credits required for general education in a course approved for global perspectives.

Code	Title	Credits
ADHM 141	Tourism and International Travel Management	3
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3
BIOL 124	Environmental Science	3
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 205	Market Values	3
EMGT 425	World Disasters	3
ENGL 240	World Literature Masterpieces	3
ENGL 336	Literature and The Environment	3
ENGL 375	The Bible as Literature	3
ENGR 312	Impact of Technology on Society	3
FREN 102	First-Year French II	4
FREN 202	Second-Year French II	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
GEOL 105L	Physical Geology Lab	1
GEOL 105	Physical Geology	3
GEOL 106	The Earth Through Time	3
GEOL 106L	The Earth Through Time Lab	1
GEOL 201	The Geology of Climate Change and Energy	3
GEOL 219	Oceanography	3
GERM 102	First-Year German II	4
GERM 202	Second-Year German II	3
GERM 220	German Culture & Society	3
HIST 320	History of Christianity	3
or RELS 320	History of Christianity	
HIST 355	History of Global Islam	3
HIST 381	Australia & New Zealand	3
INTL 110	Introduction to International Studies	3
NRM/RNG 225	Natural Resources & Agrosystems	3
PLSC 110	World Food Crops	3
POLS 120	Terrorism	3
POLS 220	International Politics	3
RELS 220	Old Testament	3
RELS 335	History of Judaism	3
RELS 340	New Religious Movements	3
RELS 345	Religion and Politics	3

RELS 355	History of Global Islam	3
SOC 116	Global Social Problems	3
SPAN 102	First-Year Spanish II	4
SPAN 202	Second-Year Spanish II	3
UNIV 151	Science and Society	3
WGS 370	Transnational/Global Women	3

North Dakota University System General Education Requirements Transfer Agreement

The North Dakota University System (NDUS) General Education Requirements Transfer Agreement (GERTA) (<https://ndus.edu/lets-get-started/transfer-to-a-different-campus/gerta/>) was established by the State Board of Higher Education to ease student transfers within the system. Although subject to revision by the board, the policies at the time of this printing were as follows:

- If students have completed the lower-division general education course requirements (36 credits or more) at one NDUS institution and transfer to another NDUS institution, then the lower-division general education requirements will have been met.

If the lower-division general education requirements have not been completed before transferring, the general education courses from the indicated areas are applicable to an appropriate general education requirement of the institution to which they are transferred. In these cases, the number of credits required to complete the general education requirement in each area is determined by the policies of the institution to which the courses are transferred.

Students transferring lower-division general education credits within the North Dakota University System need to consult with advisers in their academic programs at NDSU for two reasons. First, degree requirements of individual programs and colleges at NDSU may exceed the university-wide general education requirements. Second, meeting the university-wide lower-division general education requirements by transfer credits may not necessarily prepare students for advanced, upper-division study in an academic major at NDSU.

Students transferring from non-ND University System institutions will have their general education requirements evaluated on a course-by-course basis when they enter NDSU.

Undergraduate Classification

Undergraduate degree-seeking students are classified according to the total number of credits earned. Classification or standing in a declared plan of study may vary from the classification used by the university in determining academic standing, financial aid award levels, etc.

Classification	Completed Credits
Freshman	0 - 26
Sophomore	27 - 59
Junior	60 - 89
Senior	90 or more

Credit limitations may be placed on students who have not been fully admitted to a degree program at NDSU.

Undergraduate non-degree student: One who is not seeking a degree or who has not completed the formal application process for admission. A maximum of 15 undergraduate credits may be completed in a non-degree student status. Non-degree students are not eligible for financial aid.

Undergraduate Degree and Graduation Information

Baccalaureate Degrees

To receive a baccalaureate degree from NDSU, degree candidates must satisfactorily complete one of the degree curricula offered at NDSU in accordance with the requirements listed below and those requirements specified for their primary academic major offered by a particular academic department in a college within the university. Students are responsible for reviewing and understanding these requirements. As such, students should consult the official curriculum guide (<https://www.ndsu.edu/registrar/academics/curricula/>) of their primary major and work with their assigned academic advisor in the academic department of their major to help guide them in this process.

Degree and Graduation Requirements

Students must satisfactorily complete two sets of requirements: a) university-wide requirements including general education and b) college- or department-level requirements, which include requirements for completing majors and minors. Official college- and department-level requirements for majors and minors are available in the curriculum section (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/>) of this bulletin and in curriculum guides (<https://www.ndsu.edu/registrar/academics/curricula/>) available online. Minimum degree/graduation requirements are as follows:

1. **Minimum Total Credits:** Students must present a minimum of 120 semester credits before a degree can be posted to record. Requirements for some academic programs may exceed this degree credit minimum.
2. **Degree and Major Requirements:** Students must satisfactorily complete all degree requirements; this includes the primary major requirements and any college and/or department requirements outlined on the official curriculum.
 - a. **Declaring a major:** Students must officially declare their degree and major intent. This is done:
 - i. at the time of admission to the University on the application form submitted to the Office of Admission; or
 - ii. at the time of readmission to the University on the [Undergraduate Reactivation/Petition for Readmission](#) form submitted to the Office of Registration and Records; or
 - iii. by submitting a [Major Change Request](#) form to the Office of Registration and Records.
 - b. **Completing declared major:** Student follow the curricula that is published in the Bulletin at the time they officially declare their degree and major intent described in 2.a.i-iii. Students follow the published curricula until graduation provided their enrollment at NDSU has not been discontinued for more than one calendar year or a new major is declared (2.a.iii.).
 - c. **Adding majors/minors:** Students who wish to pursue additional majors/minors/multiple degrees/certificates must officially declare these programs to the Office of Registration and Records (2.a.iii.).
 - d. **Pre-requirements majors and selective admission majors:** Students enrolled in majors with pre-requirements or selective admission enrollment will have their program degree status changed from the pre-program to full-degree status based on information provided to the Office of Registration and Records by the respective academic department.
 - e. **Discontinue enrollment:** Students who discontinue enrollment at NDSU for more than one calendar year are subject to meeting the curricular requirements published in the Bulletin during the term of readmission.
 - f. **Degree audit:** Each program of study presented by a candidate for the baccalaureate degree is formally audited for meeting degree requirements by the Office of Registration and Records.
3. **University General Education Requirements:** Students must satisfactorily complete the university's general education program requirements as outlined by the university in the general education section of the Bulletin from the year of admission or readmission to the university.
4. **Minimum Scholastic Standing:** Students presented for graduation must meet a minimum cumulative institutional grade-point average (GPA) of 2.00. This GPA is based on coursework taken at NDSU. Coursework transferred to NDSU is not included in this GPA calculation. Some academic programs may require a higher minimum GPA, which must be clearly outlined on the official curriculum when higher than the university minimum of 2.00 is required.
5. **Resident Credit Requirement:** Resident credits are earned from courses that a student has registered and paid for at NDSU. Students must satisfactorily complete a minimum of 36 credits from courses offered at NDSU or via Tri-College registration as an NDSU student.
6. **Upper Level Credit Requirements:** Students must present a minimum of 36 credits in courses taken at the 300-400 level for degree completion. These credits may or may not be earned at NDSU.
7. **Transfer Credits:** Students with transfer credit from one or more institutions of higher education must earn a minimum of 60 credits from a baccalaureate degree granting or professional institution – which may or may not be NDSU credits. Of these 60 credits, at least 36 credits must be NDSU residence credits as defined in #5. Within these 36 NDSU resident credits, a minimum of 15 semester credits must be in courses numbered 300 or above, and 15 semester credits must be in the student's curricula for their declared major.
8. **Satisfy All Financial Obligations:** Students must satisfy all financial obligations owed to the university. Diplomas and official transcripts will not be released to students who have outstanding debts owed to the university.
9. **Application for degree:** Candidates eligible for a baccalaureate degree or a Doctor of Pharmacy degree must complete the *Application for Graduation* found in Academic Records in Campus Connection. When eligible, students will apply for graduation from the Graduation menu within the published semester deadline (<https://www.ndsu.edu/registrar/dates/>). This is a hard deadline and failure to apply by the published deadline of the planned semester could delay the awarding of the degree until the following semester. Failure to satisfy all degree requirements can also delay the awarding of a degree requiring a student to have to reapply in a future semester.

Undergraduate Majors and Minors

Majors and minors are an integral part of the baccalaureate degree curricula. Specific curriculum requirements in place for each academic year may be acquired from the NDSU Bulletin (<https://bulletin.ndsu.edu/undergraduate/program-curriculum/>) (catalog). Minimum credit for degree programs, including majors, minors, and certificates are guided by Policy and Procedure 409 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/Ebvl_zdZJcdOIRpL8BZ154MB5aRwjCABP-AuGISdvAD80g/) from the North Dakota University System (NDUS) State Board of Higher Education (SBHE). Students are responsible for following the requirements in place at the time a major or minor is officially declared with the university. Program declaration is outlined in Degree and Graduation requirements (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) in the overview section.

Major: An undergraduate major is a planned grouping of courses in an academic discipline to which a student formally commits to studying by declaring the major. Majors must total a minimum of 32 semester credits. Resident credit for a major is defined in the Degree and Graduation Requirements (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) section. Majors are earned under a specific degree type; some majors are earned as either a Bachelor of Science or a Bachelor of Arts Degree, while other majors are specialized and earned under a specialized degree type. The types of degrees offered by NDSU are listed separately in the Bulletin under Degree Types and Diploma Information (<https://bulletin.ndsu.edu/academic-policies/degree-and-graduation/>).

Minor: A minor is a similar grouping of courses in an academic discipline that students may declare to enhance their undergraduate studies. Minor must total a minimum of 16 credits. A minimum of eight credits in the minor must be earned in residence at NDSU.

Second or Multiple Majors: Students may pursue a second or multiple majors under the **same** baccalaureate degree. All requirements for the each major must be completed and at least 15 unique credits must exist between majors. Additional majors may be completed and recorded on the student's academic record after the degree for the first major has been awarded. These subsequent majors/minors will appear as a milestone statement on the academic record following the term for which the requirements were completed. **Important Note:** When majors with different degree types are declared, the requirements for a second degree apply - see the next section Second Degree).

Accelerated/Combined Degree Programs: See Degree Types and Diploma Information (<https://bulletin.ndsu.edu/academic-policies/degree-and-graduation/#acceleratedcombineddegreeprogramsugrtdtogradtext>)

Second Degree

A second baccalaureate degree type may be earned at NDSU with all of the following provisions:

1. All curriculum requirements must be satisfactorily completed.
2. Each baccalaureate degree must be different (ex. B.S. & B.A. or B.S. & B.S.E.E.). However, students may complete requirements for more than one major within a given degree, if available (see second or multiple majors).

Certificates

A certificate program is a specialized course of study requiring at least 9 credit hours at the undergraduate level or eight credit hours at the graduate level, per the NDUS SBHE Policy & Procedure 409 (https://ndusbpos.sharepoint.com/:w:/s/NDUSPoliciesandProcedures/Ebvl_zdZJcdOIRpL8BZ154MB5aRwjCABP-AuGISdvAD80g/). Certificates may be earned while in pursuit of a degree or as standalone programs of study. Prospective students interested in certificate programs, but not seeking a degree, must be accepted to the university. Contact the Office of Admission (<https://www.ndsu.edu/admission/>) or the Graduate College (<https://www.ndsu.edu/gradschool/>) for further information. Curricular requirements and verification forms are available in academic departments offering certificates. Completed forms must be signed by the appropriate department chair (and Graduate College, if applicable) and submitted to Registration and Records in order for the certificate to be posted to a student's academic record and official documentation issued.

Exceptions to Academic Program Requirements

Academic policies and curricular requirements are designed to ensure that programs at NDSU are consistently of high quality. Students are expected to complete all curricular requirements for a degree program; this includes:

- Overall University requirements (including general education),
- Any college or department requirements if applicable, and
- Major program of study requirements.

Students may request course substitutions or waivers for college or departmental requirements and major program of study requirements when extenuating circumstances prevail. Only the academic department chairperson or curriculum coordinator can approve such changes using the substitution/waiver form process established by the Office of Registration and Records.

It should be noted that academic departments should plan to teach all of the classes associated with each academic program of study curricula so that students may complete their degree in a timely manner. If required courses in the major can no longer be taught, the academic unit has two options available so students may complete their degree requirements:

1. The department chairperson or curriculum coordinator may file individual substitution/waiver forms for students requiring a curricular adjustment, or
2. Move the student to a newer curriculum in the same major in order to complete the required courses outlined on the major program of study.

Bachelor of Arts Requirement Using a Second Language

The Bachelor of Arts (B.A.) degree may be conferred upon students who complete the major requirements for their chosen field of study and have functional proficiency in at least one language other than English. The B.A. degree recognizes these students as having acquired the foundation for enhancing their ability to communicate, work, and study in an internationalized world. The B.A. signifies that these students have chosen to develop, through the equivalent of at least four semesters of coursework, both practical language skills and a comparative perspective on their own language and culture. The B.A. second language requirement fosters an awareness of the culturally conditioned nature of the students' assumptions about the world, and it better equips them with the mental agility needed to understand ways of thinking different from their own as they encounter the diversity of professional and personal relationships, as well as the intellectual and practical challenges of their future careers.

The second language requirement of the B.A. degree involves student demonstration of functional language proficiency over a sustained period of time, typically 14 credits of coursework. Given the sequential nature of language courses, the assessment of their abilities across the range of skills in speaking, reading, writing and listening comprehension is continuous and demanding. For this reason, NDSU requires that those students who have

prior language-learning experience or who present language examination scores (CLEP, etc.) take, at minimum, the exit-level (202) course in order to verify their broad functional ability and basic cultural competence. It is important to note that the language requirement is not defined in credits but in terms of proficiency or communicative competence in all four skills of speaking, reading, writing and listening comprehension.

To fulfill the B.A. language requirement a student must demonstrate competence equivalent to that normally attained after four semesters of college study (NDSU level 202). Competency may be demonstrated in the following ways:

1. Completion in any second language of coursework at the NDSU 202 level or its equivalent with a grade of 'C' or better. Note that this requirement cannot be fulfilled by coursework taken pass/fail.
2. Successful completion of any second language course with a grade of 'C' or better that has the equivalent of NDSU 202 or higher as a prerequisite.
3. For students having previously passed the CLEP Examination (p. 45) in French, German or Spanish with a CLEP score high enough for second-year college credit (59 in French, 60 in German and 63 in Spanish) or the AP exam (p. 43) with a minimum score of 4 in French, German or Spanish, taking one additional college-level language class at the 202 level or higher in order to demonstrate competency in all four skill levels. Students must complete this course with a 'C' or better.
4. English satisfies the B.A. language requirement for students whose official, certified transcripts demonstrate that their secondary or higher education was completed in a language other than English. It is the responsibility of the student to provide all necessary untranslated, official documentation to the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>) for verification. No credit will be awarded.
5. Students who are unable to provide the above mentioned certified documentation but who are native speakers of languages other than English may fulfill the second language requirement through proficiency in English by successful completion of the three-semester General Education English composition sequence and by passing an additional English (ENGL) course with a 'C' or better. Students having completed this sequence may apply to the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>) for a waiver of the Second Language requirement.
6. Requests for determination of proficiency in languages not taught at NDSU are considered by the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>). If a student would like to demonstrate proficiency through testing in a language that is not taught at NDSU, it is his/her responsibility to arrange for such testing. The proficiency test must be completed by a faculty or staff member at a college or university; the evaluator must hold at least a master's degree (in any discipline). The test must evaluate reading, writing, listening and speaking through the fourth semester (intermediate NDSU 202) college level. The student must provide documentation from the evaluator which includes a copy of the test, a letter from the evaluator assessing the level of proficiency, and a statement of the evaluator's credentials, including an explanation of his/her expertise in the language being tested, if the evaluator does not teach that language at the college level. No credit is awarded but proficiency requirement is fulfilled.

Graduation with Honor

Graduation with honor applies only to baccalaureate degrees. Candidates who have earned a minimum of 60 credits in residence at NDSU and a minimum institutional grade point average of 3.50 will graduate with honor. All final grades on the NDSU academic record will be included in grade point average calculations for graduating with honor. Students who meet these academic criteria will graduate according to one of the following honor levels:

Honor	Criteria
Summa Cum Laude	equal to or greater than 3.90
Magna Cum Laude	equal to or greater than 3.70 and less than 3.90
Cum Laude	equal to or greater than 3.50 and less than 3.70

Official Degree Audits

A degree audit is an official review of graduation requirements by the university to determine a student's degree progress and graduation eligibility. Undergraduate students who have completed approximately 70% of their degree requirements within their primary major of study are notified by the Office of Registration and Records via their NDSU email account. Students are required to complete the official university degree audit request (<https://www.ndsu.edu/registrar/forms/degreeaudit/>) linked within this email. The official degree audit is submitted to the Office of Registration and Records and is completed by a Degree and Records Analyst. This analyst performs a comprehensive audit notifying the student and the student's assigned academic advisor via NDSU email where to locate the official audit results in Campus Connection.

It should be noted that degree audits are not automatically completed as student educational and degree goals vary (multiple degree, majors, minors, etc.). Before an official audit can be completed, the student must provide additional information for a comprehensive review. If the student fails to submit the official audit, graduation could be delayed if critical graduation requirements are missed.

Tools for students to use to continually monitor degree progress

At any time, undergraduate students and academic advisers can track degree progress using the Academic Requirements Report (<https://www.ndsu.edu/registrar/academics/advising/advisement/>) (automated degree audit) feature in Campus Connection. In addition to this report, which details all degree requirements, students can also use Degree Map (<https://www.ndsu.edu/registrar/degreemap/>) to plan out their course requirements in an interactive semester-by-semester plan of study that integrates with the registration tool Schedule Planner. Both tools function using real time enrollment data that displays completed requirements, in-progress requirements, and those requirements that are yet to be satisfied.

Scholastic Standing

Records of all undergraduate and Pharm.D. students are examined at the end of each grading period. Academic progress is measured by grades and credits earned. To be eligible to register continuously without restrictions, an undergraduate or Pharm.D. student must maintain good academic standing, which is defined as a minimum cumulative institutional grade point average of 2.00 (4.00 scale). Students are notified at the end of a semester via NDSU email if they become academically deficient.

Some academic majors have academic standards that are higher than the University minimum and this information should be clearly outlined on the official major curriculum found in the University Bulletin (catalog). Students may also consult with their academic adviser or academic department for information about program specific requirements.

Academic standing relates to the following:

Good Standing

Good standing reflects when a student's term GPA and cumulative GPA are both at or above 2.00.

Academic Warning

An academic warning is to alert a student that his/her term GPA is below the minimum required for good standing, even though the institutional cumulative GPA is at or above 2.00. An academic warning does not appear on the official academic transcript but does appear on the unofficial transcript. Students are notified of their academic warning status via official NDSU email.

Academic Probation

An academic probation is issued when a student who entered the grading period on good standing or academic warning earns an institutional cumulative GPA below the minimum 2.00 for good standing. An academic probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their academic probation status via official NDSU email.

Continued Probation

Continued probation is a formal extension of the academic probation status. It is issued when a student enters the grading period on academic probation or continued probation, shows adequate progress by attaining a minimum term GPA of 2.00, but his/her cumulative institutional GPA is still below the minimum 2.00 for good standing. Continued probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. Students are notified of their continued probation status via official NDSU email.

Academic Suspension

Academic suspension is issued when a student enters the term on either probation or continued probation and earns both a term GPA and institutional cumulative GPA below the minimum 2.00 for good standing. This includes students admitted on probation for their first semester at NDSU or readmitted on probation following an academic suspension. A student may not be considered for readmission for two grading periods following an academic suspension (includes summer). An academic suspension appears on the student's official academic transcript. A suspension hold is placed on the student's record by the Office of Registration and Record which prevents all future registration. If a student has pre-registered for classes in a future semester, these courses will be administratively removed by the Office of Registration and Records. Students who are suspended are notified of their suspension status via official NDSU email.

Filing a Suspension Appeal Based on Extenuating Circumstances

A student who has been suspended may appeal the suspension **but only if there are extraordinary circumstances beyond the student's control that can be supported with documented evidence. In addition, the student must meet a minimum institutional cumulative GPA based on total NDSU credits earned.** An Appeal Academic Suspension (<https://www.ndsu.edu/fileadmin/registrar/forms/suspappeal.pdf>) form is available online and must be submitted to the Office of Registration and Records by the deadline published on the appeal form. If approved, the student must make satisfactory academic progress in the subsequent term according to the published academic standards of the University (see above). If there are no extraordinary, documented circumstances students are not eligible for this appeal.

Readmission After Serving an Academic Suspension

To be considered for readmission after serving an academic suspension, students must sit out a minimum of two grading periods (includes summer) and file a Undergraduate Reactivation/Petition for Readmission Form (<https://dmsforms.ndsu.edu/iFiller/iFiller.jsp?fref=1de6e037-8d8b-4cbc-a1d3-23c704553423>) to the Office of Registration and Records a minimum of 30 business days prior to the beginning of the semester in which the student is eligible for readmission. The petition is reviewed by a college committee and if approved, the student will be readmitted on academic probation and may register for classes.

IMPORTANT NOTE: Students who enrolled in courses at another institution while serving the terms of an NDSU academic suspension should review the NDSU repeated courses policy (p. 36) and transfer credit policy (p. 68) (#2). Students must arrange for an official transcript to be sent to the Office of Registration and Records **before** readmission will be considered. Students re-entering NDSU from an academic suspension who attended

courses elsewhere must earn a minimum cumulative GPA of 2.00 in those classes. NDSU reserves the right to revoke readmission if official transcripts are not received or the final cumulative GPA from a sending institution is below 2.00.

An Academic Suspension from Another Institution

NDSU honors suspensions of other institutions. Transfer and returning students who have been suspended from another institution may not be considered for admission or readmission until one year has lapsed or the suspension has been lifted. Students who fail to report all previous college work are subject to dismissal or loss of credit or both. Courses previously completed at NDSU may only be repeated at NDSU for grade and GPA improvement on the NDSU academic record, with the exception of Tri-College courses (see Repeated Courses (p.) section for more details).

Dean's List

To be eligible for inclusion on the Dean's List for any given semester, a student must have earned a minimum grade-point average of 3.50 during that term while completing at least 12 semester hours (nine semester hours during the summer) in graded coursework. Graded coursework includes the developmental course MATH 098. MATH 098 does not satisfy graduation requirements and does not calculate into the cumulative grade-point average on the academic record, but it is factored into the overall attempted credits and honor points for Dean's List consideration.

The Dean's List is only maintained for undergraduate students and Pharm.D. students. Credits taken simultaneously via transfer, accelerated graduate coursework, and collaborative or consortium registration are not included in the NDSU Dean's List calculation and do not count toward the NDSU minimum credit requirement. These courses are considered transfer credit (see transfer credit). No exceptions can be considered for Dean's List consideration.

NOTE: The Office of Registration and Record notifies University News of Dean's List honorees.

Academic Forgiveness

A former student who has not completed a baccalaureate degree and has not been in attendance at for six (6) or more years*, but who is presently enrolled and attending classes at NDSU may request to exclude from grade-point-average calculations all grades earned in selected full terms (quarters or semesters) completed at NDSU prior to the six-year absence.

The courses and grades for the terms selected will remain on the student's academic record, but credits, honor points, and grades will be excluded from grade-point average calculations. Excluded courses cannot be used to satisfy any academic requirements. A student may exercise this option only once so it is in the student's best interest to understand all implications and to work with a knowledgeable advisor to determine the outcome before submitting the request. Qualified students can expect the forgiveness to be processed on the academic record after the 50% refund deadline, which is approximately 10 weeks into the semester. If the request is received between semesters or during the summer, the request will be processed after the 50% refund deadline of the next full semester.

A qualifying student wishing to request academic forgiveness should submit a letter addressed to the Office of Registration and Records (<https://www.ndsu.edu/registrar/>), 110 Ceres Hall, NDSU Dept. 2801, PO Box 6050, Fargo, ND 58108-6050 (or by fax to 701-231-8959 or email to ndsu.registrar@ndsu.edu) that includes the following:

- Student full name
- Student ID number
- Mailing address
- NDSU email address
- Prior full semesters you would like considered for forgiveness

Notification of the request will be sent to the student's NDSU email account.

* **Exception:** Students who qualify for the Bachelor of University Studies general studies option (p. 717) may apply for academic forgiveness in accordance with the above policy with one exception; rather than a 6 year absence, students in this program qualify for forgiveness after a 2 year absence.

Transfer and Test Credit

Transfer credit evaluations are conducted in the Office of Registration and Records (<https://www.ndsu.edu/registrar/>). The evaluation process begins after a student is admitted to the university or has completed the reactivation process with the Office of Registration and Records if a returning NDSU student.

Administrative Policy for the Evaluation of Transfer Credit from U.S. Institutions

The Office of Registration and Records administers the NDSU policies governing the acceptance of college credit from outside institutions. These requirements apply to returning students who have attended other institutions, as well as new NDSU students. Before credits may be evaluated

for specific NDSU course equivalencies or application to programs of study, transfer courses will be accepted for university credit according to the following criteria:

1. College-level coursework from regionally accredited colleges or universities (or equivalent for international institutions), including Credit By Examination (p. 43) and the Joint Services transcripts, are eligible for acceptance in transfer with receipt of official transcript or score report.
 - a. Colleges and Universities that are regionally accredited will be recognized by any of the regional accredited agencies listed below.
 - i. Middle States Association of Colleges and Schools, Middle States Commission on Higher Education (MSCHE)
 - ii. New England Association of Schools and Colleges, Commission on Institutions of Higher Learning (NEASC-CIHE)
 - iii. North Central Association of Colleges and Schools, The Higher Learning Commission (NCA-HLC)
 - iv. Northwest Commission on Colleges and Universities (NWCCU)
 - v. Southern Association of Schools and Colleges, Commission on Colleges (SACS)
 - vi. Western Association of Schools and Colleges, Accrediting Commission of Community and Junior Colleges (WASC-ACCJC)
 - vii. Western Association of Schools and Colleges, Accrediting Commission for Senior Colleges and Universities (WASC-ACSCU)
2. Course repeats
 - a. Courses repeated elsewhere prior to attending NDSU will be accepted in transfer as indicated on the transferring institution's official transcript. Transfer courses taken from multiple institutions that have the same NDSU equivalent will be considered as a repeated course, and only the most recent attempted course will be accepted for transfer.
 - b. Courses will not be accepted in transfer to replace any grades or credits earned at NDSU. If a course is completed at NDSU, and an attempt is made to repeat that course elsewhere, the course is considered duplicate and is not eligible for transfer. (See also Repeated Courses (p.) policy.)
3. Credit for a remedial course is not accepted for transfer if the course is remedial by definition of the transferring institution or if it is equivalent to a remedial course at NDSU. Remedial courses may, however, fulfill prerequisite requirements, if applicable.
4. Credit awarded by an institution through examination, placement or prior learning credit will not be accepted.
5. The Office of Registration and Records determines the applicability of transfer credit toward NDSU general education requirements (p. 53) according to institutional and North Dakota University System guidelines. (See also General Education Administrative Policies (p. 55).)
6. College-level credits that do not have course equivalents at NDSU will be accepted as electives and may count only toward total credits. An academic department may determine whether these electives satisfy specific curricular requirements through the course substitution process.
7. NDSU requires that a minimum of 36 credits toward a baccalaureate degree be earned at the junior or senior (300- and 400-level) level. Therefore, while a freshman- or sophomore-level (100- or 200-level) course transferred from another institution may satisfy a specific upper-level program requirement at NDSU, that course will not be counted toward the 36-credit upper-division degree requirement.
8. Transfer grades are recorded but not computed in the institutional cumulative GPA at NDSU. Transfer grades are used only for purposes of admission to the University, admission to certain programs, and for some scholarships and financial aid.
9. All letter grades will be accepted by the university; however, many colleges and departments have standards to determine course applicability toward their respective degree programs.
10. The name of transfer institutions and total credits accepted by NDSU will be indicated on the official transcript. Individual transfer courses are not detailed on the official transcript but are provided in the academic requirements report (<https://www.ndsu.edu/registrar/academics/advising/advisement/>) after admission to the university.
11. Transfer credits are converted to semester credits, if applicable.

Evaluation of Transfer Credit from International Institutions

According to North Dakota University System policy (402.9) effective January 2013, international transcripts must be submitted to an approved external credential evaluation service. Obtaining an evaluation is the sole responsibility of the student. Evaluations must be submitted according to the guidelines listed below. The policies for the evaluation of transfer credit listed for Domestic/US Institutions also apply to international transfer credit. NDSU students participating in an approved study-abroad program and international students transferring from a North Dakota State University partnership institution are exempt from submitting an external credential evaluation.

- Students must submit official transcripts to an evaluation service that has been approved by the National Association of Credential Evaluation Services (NACES) (<https://www.naces.org/members/>) or the Association of International Credential Evaluators (AICE) (<http://aice-eval.org/endorsed-members/>).
- Official transcript(s) issued in English must be submitted to NDSU in addition to the evaluation unless the evaluation service provides certification of student documents and sends copies of transcript(s) to NDSU.
- The evaluation must contain a **course by course** evaluation.
- New international students should send evaluations directly to the Office of International student and Study Abroad Services (https://www.ndsu.edu/admission/how_to_apply/international/transfer/).
- New domestic students or United States permanent resident students should send evaluations directly to the NDSU Office of Admission (https://www.ndsu.edu/admission/how_to_apply/transfer/requirements/).

- Students must submit course syllabi for all completed coursework directly from the international institution to the NDSU Office of Registration and Records (<https://www.ndsu.edu/registrar/>).
- Effective January 2020, all international transfer coursework listed as “English as a Foreign Language” will not be accepted for NDSU English composition courses.

North Dakota University System Common Course Numbers

Institutions in the North Dakota University System have established common course numbers (CCN) (<https://ndus.edu/lets-get-started/transfer-to-a-different-campus/common-course-numbering-ccn/>) to facilitate transfer within the University System. Under the CCN agreement, transfer students who have successfully completed CCN courses will not be required to retake them at NDSU unless their degree program requires a higher grade. However, CCN courses will not fulfill residence requirements nor will 100- and 200-level courses fulfill the upper-division requirement for graduation.

Evaluation of Military Credit

North Dakota State University accepts military courses recognized by the American Council on Education (ACE). Students who have completed military courses may receive transfer credit from NDSU. When evaluating military courses, the Office of Registration and Records will follow the criteria illustrated below:

1. Only Joint Services Transcripts that are sent electronically from the American Council on Education will be considered official and will be accepted.
2. Courses listed under “Military Courses” will be accepted for credit. Courses listed under “Military Occupations”, “College Level Test Scores”, and “Other Learning Experiences” on the Joint Services Transcript will not be accepted for credit.
3. Basic Military Training courses will transfer as an elective but will earn credit towards the General Education Category: Wellness (W).
4. Each course listed under Military Courses will be awarded the number of credits recommended by the American Council on Education.
5. Courses that do not have an NDSU equivalency will be set as electives. These courses will be evaluated per the American Council of Education’s recommendations.
6. Courses that are recommended as vocational or graduate level will not be accepted for transfer.

Joint Services Transcript Order Information:

Website: Joint Services Transcript Request (<https://jst.doded.mil/official.html>)

Email: jst@doded.mil

Undergraduate Programs of Study

A (p. 70) B (p. 71) C (p. 71) D (p. 72) E (p. 72) F (p. 72) G (p. 72) H (p. 73) I (p. 73) J (p. 73) K L (p. 73)
M (p. 73) N (p. 74) O P (p. 74) Q R (p. 74) S (p. 75) T (p. 75) U (p. 75) V (p. 75) W (p. 75) X Y Z (p. 75)

A program of study provides a summary overview of the major and a sample 4-year plan of study (or 5-year or 6-year depending on program). The plan of study is an informal curriculum offering a suggested sequence of courses by semester. Plans of study are intended to be flexible based on a number of individual student factors. A link to the official curriculum is included in each overview.

M=Major, m=minor, C=Certificate, D=Dual major, 2nd=Second Major only

A

Accounting (p. 75) M,m

Advertising and Design (p. 80) C

Aerospace Studies (p. 82) m

Aging Studies (p. 84) C

Agribusiness (p. 85)* M,m

Agricultural and Biosystems Engineering (p. 94)* M

Agricultural Communication (p. 112) M,m

Agricultural Economics (p. 114)* M

Agricultural Education (p. 90) M

Agricultural Systems Management (p. 119) M,m

Animal Science (p. 130) M,m

Anthropology (p. 133) M,m

Apparel, Retail Merchandising and Design (p. 137) M,m,C

Architecture (p. 145) M

Art (p. 148) M,m

Art Education (p. 156) M

B

Banking (p. 160) m

Behavioral Statistics (p. 163) M

Biochemistry and Molecular Biology (p. 164) M,m

Biological Sciences (p. 169)* M,m

Biological Sciences Education (p. 182) M

Biomedical Engineering (p. 184) m

Biotechnology (p. 186) M,m

Botany (p. 191) m

Business Administration (p. 192) M,m

Business Education (p. 197) M

C

Chemistry (p. 202) M,m

Chemistry Education (p. 210) M

Civil Engineering (p. 212)* M

Coatings and Polymeric Materials (p. 218)* m

Community Development (p. 221) m

Comprehensive Science Education (p. 222) M

Computer Engineering (p. 228)* M

Computer Science (p. 238)* M,m

Computer Science and Mathematics (p. 242) D

Computer Science and Physics (p. 247) D

Construction Engineering (p. 248)* M

Construction Management (p. 254) M

Creative Writing (p. 260) m

Criminal Justice (p. 264)* M,m

Crop and Weed Science (p. 266) M,m

D

Dietetics (p. 272)* M

E

Earth Science Education (p. 280) M

Economics (p. 283)* M,m

Electrical Engineering (p. 289)* M

Electrical Engineering & Physics (p. 295) D

Elementary Education & Human Development and Family Science (p. 301) (Dual Degree Program with Valley City State University) D

Emergency Management (p. 304) M,m

English (p. 310) M,m

English Education (p. 322) M

Entrepreneurship (p. 326) m, C

Environmental Design (p. 327) M

Environmental Engineering (p. 332) M

Environmental Geology (p. 337) m

Equine Assisted Activities and Therapies (p. 344) m

Equine Science (p. 338) M,m

Exercise Science (p. 347) M

Extension Education (p. 349) m

F

Family and Consumer Sciences Education (p. 350) M

Family Financial Planning (p. 354) C

Finance (p. 357) M,C

Food Science (p. 360)* M

Food Science and Technology (p. 364) m

Fraud Investigation (p. 366) m

French (p. 366) M,m

French Education (p. 371) M

French Studies (p. 376) m

G

General Agriculture (p. 376) M,m

Geography (p. 381) m

Geology (p. 385) M,m

German (p. 387) m

German Studies (p. 388) m

Gerontology (p. 389) m

GIS and Remote Sensing (p. 391) C

Global Business (p. 393) 2nd

H

Health Education (p. 394) M

Health Services (p. 399) M

History (p. 403) M,m

History Education (p. 410) M

Honors Program (p. 413) m

Horticulture (p. 414) M,m

Hospitality and Tourism Management (p. 423) M,m

Human Development and Family Science (p. 430)* M,m

I

Industrial Engineering and Management (p. 437) M,m

Interior Design (p. 442) M,m

International Studies (p. 451) 2nd

J

Journalism (p. 452) M,m

L

Landscape Architecture (p. 331) m

Large Animal Veterinary Technology (p. 457) m

Logistics Management (p. 459) m

M

Management (p. 459) M

Management Communication (p. 464) M,m

Management Information Systems (p. 469) M,m

Managerial Psychology (p. 476) m

Manufacturing Engineering (p. 476) M,m

Marketing (p. 482) M

Mathematics (p. 487) M,m

Mathematics and Computer Science (p. 242) D

Mathematics Education (p. 503) M

Mathematics and Physics (p. 491) D

Mathematics and Statistics (p. 495) D

Mechanical Engineering (p. 505)* M

Mechanical Engineering and Physics (p. 510) D

Medical Laboratory Science (p. 514) M

Microbiology (p. 521) M,m

Military Science (p. 523) m

Music (p. 525) M,m

Includes the following:

- BS/BA Music
- Bachelor of Music programs (instrumental, piano, vocal, composition)

Music Education (p. 558) - Bachelor of Music programs (instrumental and vocal) M,m

N

Natural Resources Management (p. 565) M,m

Neuroscience (p. 576) m

Nursing (p. 583) M

P

Pharmacy (p. 589) (includes the pre-pharmacy requirements and the B.S. in Pharmaceutical Sciences) M

Philosophy/Ethics (p. 595) M

Philosophy/Humanities (p. 595) m

Physical Education (p. 601) M

Physics (p. 604)* M,m

Physics and Computer Science (p. 247) D

Physics Education (p. 612) M

Physics and Mathematics (p. 491) D

Political Science (p. 623) M,m

Precision Agriculture (p. 627) M,m

Pre-Law (p. 625) m

Professional Selling (p. 632) C

Psychology (p. 633) M,m

Public Health (p. 640) m

Public History (p. 643) M

Public Policy (p. 645) m

Publishing (p. 647) C

R

Radiologic Science (p. 647) M

Range Science (p. 652) m

Reliability Engineering (p. 654) m

Religion (p. 653) m

Respiratory Care (p. 655) M

Robotics (p. 660) m

S

Social Science Education (p. 661) M

Social Work & Human Development and Family Science (p. 667) (Dual Degree Program with Minot State University) D

Sociology (p. 672) M,m

Soil Science (p. 676) m

Spanish (p. 680) M,m

Spanish Education (p. 681) M

Spanish Studies (p. 685) m

Sport Management (p. 687) M

Statistics (p. 691) M,m

Statistics and Mathematics (p. 495) D

Strategic Communication (p. 698) M,m

T

Theatre Arts (p. 700) M,m

Tribal and Indigenous Peoples Studies (p. 715) m

U

University Studies (p. 717) M

V

Veterinary Technology (p. 723) M

W

Wellness (p. 725) m

Women and Gender Studies (p. 726) M,m

Z

Zoology (p. 731) m

* NDSU offers combined/accelerated degree programs for highly-qualified students to earn both a bachelor's and master's degree in a cost-effective, quality, and timely manner with department approval. These disciplines are currently available as combined/accelerated programs.

Accounting

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/majors/ (<http://www.ndsu.edu/business/programs/undergraduate/majors/>)
- **Credential Offered:**
B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/accounting/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/accounting/>)

Accounting is the analysis, interpretation and communication of financial information about the resources of an organization and the use of those resources. Accountants help others make business decisions and provide auditing and tax services, as well as fraud examination (forensic accounting services).

The Program

The accounting major offered by the College of Business prepares students for entry-level positions in public accounting, corporate accounting, government accounting and forensic (fraud) accounting. The accounting curriculum includes accounting and business courses with a wide range of other courses selected to help develop well-rounded, well-educated graduates. Computer and information systems courses give students the ability to apply accounting knowledge using computers—a very important skill in today's business environment. Courses in other areas of business help students understand how their work relates to marketing, management and finance.

North Dakota law requires that persons who sit for the Certified Public Accountant (CPA) professional examination must have completed 150 semester hours of college education. Students can meet this requirement through a combination of the undergraduate accounting major and the Master of Accountancy (MAcc.) degree offered at North Dakota State University.

To succeed in the accounting profession, an individual should have a solid mathematical background and be able to interpret information. Good communication skills are essential to be able to present information to others. Interpersonal skills and the ability to work with others are also important.

Career Opportunities

An accountant could find a position in public accounting, management, private industry, governmental or other not-for-profit accounting, academia or forensic accounting. Therefore, the employment opportunities for an accountant are many and varied. In addition, some students use accounting as a pre-law program.

The most familiar professional designation in accounting is the CPA. Achieving this certification involves passing a comprehensive examination and meeting other requirements set by each state. CPAs provide auditing, tax and advisory services to businesses, other organizations and the general public.

Management accountants are employed by a single enterprise to perform services such as measuring and controlling costs or budgeting. These specialists may earn the Certified Management Accountant (CMA) certificate.

Internal auditors are concerned with determining whether the auditee is following prescribed organizational policies and procedures along with safeguarding organizational assets. The Certified Internal Auditor (CIA) is the professional designation of these accountants.

An accountant may also work in the area of governmental or not-for-profit accounting. Governmental accountants work for federal, state or local government agencies. The duties of governmental accountants include the control of tax revenues and expenditures. Not-for-profit organizations, such as charities and universities, also need the services of an accountant.

Forensic accounting is a rapidly growing area of accounting concerned with the detection, investigation and prevention of fraud and white-collar crimes. A Certified Fraud Examiner (CFE) is a specialist in the detection and/or deterrence of a wide variety of fraudulent conduct—from discovering employees or executives who misappropriate company assets to assisting investors who are defrauded in the course of commercial transactions.

Accountants also are employed in the academic sector to teach accounting courses, conduct research and write educational materials such as textbooks.

ACCOUNTING PRACTICUM (INTERNSHIP)

Accounting majors are able to gain experience at professional level jobs through the Accounting Practicum (Internship). Students usually take their Accounting Internship during the final two years of the program.

Students fulfill the three-credit practicum requirement through a semester-long, full-time work placement. Students must consult with their faculty advisor and obtain approval prior to enrolling in the practicum through NDSU's Career and Advising Center.

Selective Admission

Students who wish to study accounting at NDSU enroll as pre-accounting majors in the College of Business for the first semester of their freshman year. Pre-accounting majors are then admitted into the professional program after completing the pre-professional courses required for professional program admission (i.e., ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and earning a minimum 2.5 cumulative GPA. Transfer students with appropriate course work may be admitted directly into the professional program. Please see a College of Business professional advisor for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
ENGL 110		3 COMM 110	3		
PSYC 111 or SOC 110		3 ENGL 120	3		
Gen Ed Humanities/Fine Arts & Cultural Diversity		3 MATH 144	4		
Gen Ed Wellness		2 Gen Ed Sci & Tech (w/lab)	4		
Elective		4			
		15	14		
Sophomore					
Fall	Credits	Spring	Credits		
ACCT 200		3 ACCT 201	3		
ECON 201		3 ECON 202	3		
TL 116		3 PHIL 216	3		
STAT 330		3 STAT 331	2		
Elective		3 Gen Ed Science & Tech	3		
		15	14		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ACCT 311		4 ACCT 312	4	ACCT 397 ¹	3
ACCT 320		3 ACCT 420	3		
ENGL 320		3 BUSN 430	3		
MRKT 320		3 MGMT 320	3		
MIS 320		3			
		16	13		3
Senior					
Fall	Credits	Spring	Credits		
ACCT 318 or 418		3 BUSN 489	3		
ACCT 421		3 300-400 Level Business Electives (2)			
FIN 320		3 300-400 Level Accounting Elective			
300-400 Level Business Elective		3 Elective			
Elective		3			
		15			

Total Credits: 120

¹ Complete one of the following options: ACCT 413 Internship, ACCT 397 Cooperative Education Program, UNIV 492 Study Abroad Program, AGECE 371 Export Management, or MGMT 470 Entrepreneurship/Small Business Management. ACCT 413 and ACCT 397 require a grade of C or better in ACCT 311.

Accounting

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/accounting/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/accounting/#planofstudytext>)

Degree Requirements

Major: Accounting

Degree Type: Bachelor of Science (B.S.)

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Accounting Requirements

Code	Title	Credits
All courses taken for the Accounting Major require a grade of C or better. The only exception is ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, which require grades of 'B' or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300 - 400 level courses, and to graduate.		
Admission to the Professional Program Requirements		
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C)	3
ECON 201 or ECON 202	Principles of Microeconomics (May satisfy general education category B and G) Principles of Macroeconomics	3
ENGL 120	College Composition II (May satisfy general education category C)	3
MATH 144	Mathematics for Business	4
PSYC 111 or SOC 110	Introduction to Psychology (May satisfy general education category B) Introduction to Sociology	3
Accounting Major Requirements		
ACCT 200	Elements of Accounting I (Requires a grade of B or better)	3
ACCT 201	Elements of Accounting II (Requires a grade of B or better)	3
PHIL 216	Business Ethics (May satisfy general education category A)	3
TL 116	Business Software Applications	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
ECON 201 or ECON 202	Principles of Microeconomics ¹ Principles of Macroeconomics	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
Admission to the Professional Program is required prior to taking the following courses:		
FIN 320	Principles of Finance ²	3
MGMT 320	Foundations of Management ²	3
MRKT 320	Foundations of Marketing ²	3
BUSN 430	Legal and Social Environment of Business ²	3
BUSN 489	Strategic Management (Capstone Course) ²	3
MIS 320	Management Information Systems ²	3
ACCT 311	Intermediate Accounting I	4
ACCT 312	Intermediate Accounting II	4
ACCT 318 or ACCT 418	Taxation in Management Decisions Tax Accounting I	3
ACCT 320	Cost Management Systems	3
ACCT 420	Accounting Information Systems	3
ACCT 421	Auditing I	3
Accounting Elective (ACCT Prefix) 300-400 Level		3
Select courses from current ACCT curriculum.		
Accounting Elective Courses 300-400 Level		9
Select courses from within the CoB prefixes of BUSN, FIN, MIS, MGMT, MRKT, TL; excludes BUSN 318. Courses numbered 394/494 require departmental approval. Includes courses cross-listed with CoB courses.		
Accounting Practicum		3
Students must complete one of the following options:		
ACCT 397	Fe/Coop Ed/Internship	
ACCT 413	Accounting Internship	
AGEC 371	Export Management	
MGMT 470	Entrepreneurship/Small Business Management	
UNIV 492	Study Abroad	
Total Credits		92

- ¹ Take course not taken prior to admission to professional program.
- ² Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students follow the published curricula for the accounting program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission to the Accounting major is required to enroll in advanced 300- 400 level CoB courses.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- Students must earn a 2.50 institutional GPA to graduate.
- Students must be accepted to the accounting major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Prerequisite for Accounting Practicum: ACCT 311 with a grade of C or better.

Minor Requirements

Minor: Accounting

Required Credits: 19

Minor requirements

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
ACCT 311	Intermediate Accounting I	4
ACCT 320	Cost Management Systems	3
ACCT 300-400 Level Courses		6
Courses may be chosen from any 300-400 level accounting course with the exception of ACCT 397 and ACCT 413.		
Total Credits		19

- * Requires a grade of 'B' or better in order to enroll in 300-400 level ACCT courses.

Minor Requirements and Notes

- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA.
- To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements. Courses may not be taken pass/fail. Students must also earn a grade of 'C' or better in all courses required for the minor; the only exception is ACCT 200 and ACCT 201, which require grades of 'B' or better.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the College of Business courses until the cumulative GPA returns to 2.50 or above.
- Students are subject to the minor requirements in effect during the year in which the minor was approved.
- Minors must satisfy all course prerequisites.
- Approval for a minor does not guarantee enrollment in specific courses.

Advertising and Design Certificate

Department Information

- Department Location:**
Minard 338

- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/advertising-design/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/advertising-design/>)

NDSU's interdisciplinary Advertising and Design Certificate allows students to customize their advertising education to meet industry trends by combining individualized course offerings in communication, visual arts, retail, business, and English with two required courses. This certificate enhances a student's skills training for a career in integrated marketing communications such as graphic design or advertising creative, advertising account planning, social media messaging, visual merchandising and promotion, and many other advertising and design related fields.

Advertising and Design Certificate

Department Information

- **Department Location:**
Minard 338
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
Undergraduate Certificate
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/advertising-design/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/advertising-design/>)

Certificate Requirements

Advertising & Design Certificate

Required Credits: 12

Code	Title	Credits
COMM 375	Principles of Strategic Communication	3
Content Topics/Electives		6
Art		
ART 385	Advanced Topics in Graphic Design	
Business		
ENTR 201	Introduction to Entrepreneurship	
ENTR 301	Entrepreneurship Toolbox I	
MRKT 320	Foundations of Marketing	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 465	Digital Marketing	
Communication		
COMM 376	Advertising Creative Strategies	
COMM 377	Media Planning	
COMM 470	Research for Strategic Communication	
English		
ENGL 229	Introduction to Creative Writing	
ENGL 322	Writing and the Creative Process	
ENGL 449	Usability and User Experience	
Retail		
ADHM 171	Fashion Dynamics	

ADHM 271	Visual Merchandising and Promotion	
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	
ADHM 425	Experiential Retailing	
Capstone		
COMM 476	Advertising Campaign Practicum	3
Total Credits		12

Program Notes:

- Students are required to take at least 6 credits outside of their major if their major is represented in the course offerings; at this time communication students are the only students affected by this requirement.
- The target market majors for this certificate are in Communication, Visual Art/Design, Business, English and Apparel Retail Merchandising and Design.

Aerospace Studies

Department Information

- **Department Location:**
Bentson/Bunker Field House
- **Department Phone:**
701-231-8186
- **Department Web Site:**
www.ndsu.edu/afrotc/ (<http://www.ndsu.edu/afrotc/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/aerospace-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/aerospace-studies/>)

Air Force Reserve Officer Training Corps (AFROTC) is a program that prepares you to become an Air Force or Space Force Officer. It's a challenge. It's an opportunity. It's a head start on a lifetime of success within the Air Force or Space Force and everything you choose to do. AFROTC provides you with a challenging program to hone your time management, physical fitness and analytical skills - and helps you push yourself to achieve your goals.

What is the Purpose of Air Force ROTC?

The AFROTC (Aerospace Studies) mission is to commission second lieutenants through the campus program offered at NDSU. Also, Aerospace Studies offers this program for students at Concordia College, Mayville State University, Minnesota State University Moorhead, University of Minnesota Crookston, University of North Dakota, Park University and students at the Grand Forks Air Force Base. Students enrolled in AFROTC earn college credits that can be used to fulfill elective requirements or to obtain a minor in Aerospace Studies. All full-time students (including graduate students) can pursue an Air Force or Space Force commission.

What is an Air Force or Space Force Commission?

An Air Force or Space Force commission is your ticket to work in top professional and management jobs in the United States Air Force or Space Force. Only college graduates can obtain an Air Force or Space Force commission, which is granted by the President of the United States.

Are You Interested in Flying?

The Air Force owns the most modern aircraft in the world. Those who meet the demanding physical, medical and academic qualifications are selected as pilot candidates and will attend Air Force pilot training at their first active duty assignment.

Are You Interested in Space?

The Space Force controls a vast assortment of satellites and other ground based architecture to meet the demanding requirements of space based systems. Those who meet the physical, medical and academic qualifications are selected as Guardians and will attend their respective space force training at their first active duty assignment.

Does a Technical or Management Career Interest You?

AFROTC graduates have opportunities in more than 250 specialized fields in which their education and training can be utilized. These specialties include physicists, space scientists, journalists, doctors, dentists, meteorologists, engineers, security and intelligence specialists, nurses and many others.

The General Military Course

The first two years of this four-year program begins with the General Military Course (GMC). It takes a time commitment of about five to six hours a week. Here, you'll learn the mission and structure of the Air Force and Space Force and take a look at what military life is like. You will study the strategies, doctrine and missions of aerospace power from early ballooning to today's use of space vehicles. You will learn about Air Force and Space Force career opportunities, educational benefits and the life and work of an Air Force or Space Force officer.

The Professional Officer Course

The Professional Officer Course (POC) is the second half of our four-year program and is taken during your junior and senior years. You will begin this course with an in-depth look at leadership styles and their applications. You will examine a broad range of American domestic and international military relationships and the environmental context in which American national security policy is developed and carried out. This class, combined with Leadership Laboratory, is where your leadership and management theories are applied. This is a competitive course and not all cadets who apply get in. Your performance during the GMC program is the driving factor of your selection into the POC program.

Scholarship Money?

AFROTC college scholarships are awarded to the best-qualified students and range in length from one to five years. These grants cover the cadet's tuition, incidental lab fees and up to \$900 a year for textbooks. In addition, cadets receive a tiered monthly allowance. For example, cadets enrolled in the Professional Officer Corps (POC) receive \$450 per month during their junior academic year and \$500 per month during their senior academic year.

Obligation?

If you are not on an AFROTC scholarship, you incur *no obligation* to the Air Force or Space Force during your freshman and sophomore years of school. You are able to keep all your options open while you take an in-depth look at the Air Force and Space Force and the opportunities they have to offer. The length of your commitment upon graduation is dependent on the career you pick when entering active duty. Those service obligations are typically 4 years for non-flying officers and longer for those who chose to serve in an aircrew career field.

Guaranteed Job/Salary/Benefits

Students who successfully commission into the Air Force or Space Force can expect the following as soon as they enter the Active Duty work force:

- Highly competitive salary, starting at \$55,000/year with guaranteed raises every two years
- Tax-free housing and food allowance
- 30 days of paid vacation a year
- unlimited, full pay sick leave
- full medical, dental and vision coverage at no cost
- competitive retirement package

For more information on Air Force ROTC admission requirements and career opportunities, please contact the Unit Admissions Officer at 701-231-8186.

Aerospace Studies

Department Information

- **Department Location:**
Bentson/Bunker Field House
- **Department Phone:**
701-231-8186
- **Department Web Site:**
www.ndsu.edu/afrotc/ (<http://www.ndsu.edu/afrotc/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/aerospace-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/aerospace-studies/>)

Minor Requirements

Minor: Aerospace Studies

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required General Military Courses (Year 1-2)		
AS 111	Heritage and Values of the U.S. Air Force I	1
AS 112	Heritage and Values of the U.S. Air Force II	1
AS 211	Team and Leadership Fundamentals I	1
AS 212	Team and Leadership Fundamentals II	1
Required Professional Office Courses (Years 3-4)		
AS 321	Leading People and Effective Communication I	3
AS 322	Leading People and Effective Communication II	3
AS 441	National Security/Leadership Responsibilities & Commissioning Preparation I	3
AS 442	National Security/Leadership Responsibilities & Commissioning Preparation II	3
Total Credits		16

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Aging Studies

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall 283
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/aging-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/aging-studies/>)

Throughout the world, people are living longer than ever before. Aging Studies is a growing field that is relevant to many careers in varying disciplines, and professionals with credentials in this area are in high demand. The Aging Studies undergraduate certificate enables students to learn more about current issues that affect adults as they age. Required courses cover physical, cognitive, social, financial, psychological, societal, and cultural aspects of aging. Students will learn foundational information, as well as how to apply it in real-world contexts to improve quality of life for older adults and their families.

Aging Studies

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/aging-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/aging-studies/>)

Certificate Requirements

Aging Studies

Certificate Requirements

Required Credits: 9

Code	Title	Credits
HDFS 360	Adult Development and Aging	3
HDFS 480	Community Resources of Later Life	3
HDFS 482	Family Dynamics of Aging	3
Total Credits		9

Agribusiness

Department Information

- **Department Location:**
Richard H. Barry Hall Room 500
- **Department Phone:**
701-231-7441
- **Department Email:**
ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/agribusiness/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agribusiness/>)

The agribusiness industry accounts for nearly one-fifth of the U.S. gross national product and employs close to one-fourth of the U.S. labor force. There is a continuing strong demand by agribusiness firms, ranging from large multinational corporations to emerging food manufacturing and input supply firms, for highly qualified and better trained employees in both management and the agricultural sciences. Students who have mastered economic and business concepts along with agricultural sciences do extremely well in finding rewarding careers following graduation.

The Program

The agribusiness program at North Dakota State University recognizes the importance of agribusiness to the nation's economy and the long tradition of the department in training the industry's leaders. The agribusiness major has several main components.

Students are exposed to a range of concepts and methods useful in agribusiness decision-making in each of three areas of specialization: finance, management and marketing. Equally important, agribusiness graduates will master problem solving and effective communication skills to face challenges encountered in their professional careers.

Agribusiness students are required to participate in an internship during their studies. Employers continue to place high importance on work-related experience when they evaluate potential employees. Employers know that all NDSU agribusiness graduates have gained valuable work experience through the required internship.

Collaboration with the College of Business leads to concurrent satisfaction of a minor in one of the business fields. A minor in accounting, business administration, logistics management, or entrepreneurship is required.

The Department of Agribusiness and Applied Economics also offers an agricultural economics major. Students should refer to the Agricultural Economics fact sheet. Students in economics or other majors outside the department may earn a minor in agribusiness.

Career Opportunities

Agribusiness graduates find career openings in many areas of specialization, including positions as international and domestic grain traders; elevator managers; sales representatives with chemical, seed, feed and fertilizer companies; analysts for railroads, transport and renewable energy companies; logistics managers; finance and credit officers; food company managers; experts with the foreign agriculture service; and analyst positions in market development organizations. In addition to a rewarding set of career opportunities following graduation, many students choose to continue with graduate studies to further develop their analytical and management skills. Although many graduates find successful careers in North Dakota and Minnesota, others pursue careers throughout the nation and the world.

The Faculty

The department enjoys a growing international reputation for its excellent staff in agribusiness research and teaching. Faculty specialties include sales, finance, food marketing, food safety, industrial strategy, and commodity trading.

Agribusiness faculty expertise is complemented by other departmental faculty specializing in farm management, natural resource and environmental economics, and economic development. The quality of the faculty has been recognized by numerous awards for teaching and research excellence at both the state and national levels.

Financial Aid and Scholarships

Several \$500 scholarships are available to outstanding freshmen entering the program each fall semester. Scholarships also are available to transfer students and students already in the agribusiness program at NDSU.

The department annually awards over \$100,000 in scholarships (ranging from \$500 to \$10,000) to agribusiness and agricultural economics majors.

The College of Agriculture, Food Systems, and Natural Resources awards scholarships each year. For more information on scholarships, go to: <https://www.ndsu.edu/admission/scholarships/>.

Student loan, grant and work-study information is available from the Office of Financial Aid and Scholarships or One Stop.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ECON 189 ¹		1 ENGL 120	3
ENGL 110		3 ECON 201	3
Science & Tech Gen Ed w/ Lab		4 TL 116	3
Wellness Gen Ed		2 COMM 110	3
MATH 144		4 Sci & Tech Gen Ed	4
		14	16
Sophomore			
Fall	Credits	Spring	Credits
AGEC 242		3 AGECE 244	3
ECON 202		3 AGECE 246	3
STAT 330		3 ECON 341	3
ACCT 200		3 ACCT 201 (or Free Elective)	3
AGEC 339		3 STAT 331	2
		Sci & Tech Gen Ed	3
		15	17
Junior			
Fall	Credits	Spring	Credits
AGEC 339		3 AGECE 344	3
ECON 343		3 AGECE 346	3
Upper Level COMM Elective		3 Ag Science Elective	3
BUSN or ACCT elective for Minor		3 BUSN or ACCT elective for Minor	3
Hum & Fine arts Gen Ed		3 AGECE 397 (Internship)	1
		Hum & Fine Arts Gen Ed	3
		15	16

Senior			
Fall	Credits	Spring	Credits
AGEC 444, 446, or MGMT 320*		3 AGEC 445	3
One additional course from the area		3 BUSN or ACCT electives for Minor	3
Free Electives		3 Ag Science Elective	3
Ag Science Elective		3 Upper Level ENGL Gen Ed	3
BUSN or ACCT electives for Minor		3	
15			12
Total Credits: 120			

* Area of specialization requires one core course plus one other course from the specialization.

1 ECON 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take ECON 189

Agribusiness

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-7441
- **Department Web Site:**
www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agribusiness/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/agribusiness/#planofstudytext>)

Degree Requirements

Major: Agribusiness

Degree Type: Bachelor of Science (B.S.)

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	

ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Core Courses for Agribusiness:		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
AGEC 339	Quantitative Methods & Decision Making	3
AGEC 344	Agricultural Price Analysis	3
AGEC 346	Applied Risk Analysis	3
AGEC 397	Fe/Coop Ed/Internship	1-3
AGEC 445	Agribusiness Industrial Strategy (capstone)	3
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
Accounting:		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
Agriculture Science & Technology:		9
Complete nine (9) credits from two (2) areas in the College of AFSNR other than Agribusiness & Applied Economics. (Includes: ASM, ANSC, ABEN, CFS, ENT, MICR, NRM, PPTH, PLSC, RNG, SOIL & VETS.) EXCEPTION - All 9 credits may be in the same area if a student completes a minor from within the College of AFSNR.		
Areas of Specialization: Select one of the Areas of Specialization listed below.		6
Additional Requirements for Agribusiness		
AGRI 150	Agriculture Orientation	1
ECON 189	Skills for Academic Success	1
MIS 116	Business Software Applications (May satisfy general education category S)	3
Communication Requirement: Select one of the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication (Gen Ed B/D)	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 383	Organizational Communication I	
Math Requirement:		
MATH 144	Mathematics for Business (or any higher math)	4

STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2 or 3
or ECON 410	Econometrics	

Minor Requirement	19-24
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In addition to the requirements for the major in Agribusiness, students must complete a minor in Accounting (19 cr), Business Administration (24 cr), Entrepreneurship (16 cr), Logistics Management (19 cr), or Banking (18 cr).

Total Credits	91-99
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Areas of Specialization: Select one

Code	Title	Credits
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Finance - 6 Credits

AGEC 446	Agribusiness Finance	3
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Select one of the following:	3
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AGEC 347	Principles of Real Estate	
AGEC 356	Advanced Agricultural Lending	
AGEC 474	Cooperatives	
ECON 324	Money and Banking	
ECON 402	Economics of Entrepreneurship	
ECON 470	Public Economics	

Total Credits	6
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Code	Title	Credits
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Management - 6 Credits

MGMT 320	Foundations of Management	3
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Select one of the following:	3
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AGEC 474	Cooperatives	
AGEC 375	Applied Agricultural Law	
AGEC 378	Introduction to Transportation & Logistics	
AGEC 472	Advanced Logistical Analysis	
ECON 402	Economics of Entrepreneurship	
ECON 472	International Trade	

Total Credits	6
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Code	Title	Credits
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Marketing - 6 Credits

AGEC 444	Advanced Commodity Trading	3
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Select one of the following:	3
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AGEC 343	Introduction to Commodity Trading	
AGEC 350	Agrisaless	
AGEC 474	Cooperatives	
AGEC 450 & AGEC 451	National AgriMarketing Association (NAMA) I and National AgriMarketing Association (NAMA) II	
ECON 402	Economics of Entrepreneurship	
ECON 472	International Trade	

Total Credits	6
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¹ AGRI189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

Degree Requirements and Notes

- Students must earn, at least, a 2.00 cumulative GPA that is based on the courses that satisfy major requirements.

Minor Requirements

Minor: Agribusiness

Required Credits: 18

Minor Requirements

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
Select two of the following:		6
AGEC 242	Introduction to Agricultural Management	
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
Elective Courses: A minimum of 9 credits from the following:		9
ECON 341	Intermediate Microeconomics	
AGEC	Any AGECE prefix courses numbered 242 or higher (excluding AGECE 397 and AGECE 496)	
Total Credits		18

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- Minor requirements are to be met with didactic courses only.
- This minor is not available to Agricultural Economics majors.

Agricultural Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center 210
- **Department Phone:**
701-231-7439
- **Department Web Site:**
www.ndsu.edu/ted/ (<http://www.ndsu.edu/ted/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-education/>)

The agricultural education major prepares candidates to teach at the middle, secondary, post-secondary and adult levels in agricultural education programs. North Dakota State University is designated by the State Board of Career and Technical Education as the recognized institution for preparing teachers of agricultural education.

Agricultural education teacher candidates begin their preparatory work in the pre-agricultural education program offered through the College of Agriculture, Food Systems, and Natural Resources.

The Program

The agricultural education major is designed to combine general studies, preparation for effective teaching, and a broad background in the various disciplines in agriculture. Those preparing to become teachers of agriculture are expected to possess a broad general education necessary for them to function as citizens and educators in our dynamic society. Courses in natural sciences, mathematics, social sciences, humanities, English, communication and speech will help provide a general education and the skills needed for more advanced courses in agriculture and other areas. Courses in agricultural economics, agricultural systems management, animal and range science, plant sciences, horticulture and soil science provide the necessary background in agriculture. Electives also are available in entomology, veterinary science, plant pathology and cereal science. Skills in organizing, planning, communicating and teaching are developed by taking courses in psychology, sociology, education and a series of other courses in various aspects of agricultural education.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found at the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced agricultural educators in middle or secondary schools. Faculty members from NDSU conduct monthly on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Occupational Experience

An appropriate background of work experience in agriculture is essential for those planning to teach agriculture. Teacher candidates lacking this experience will need to seek such experience through internships, employment and other means. Cooperative Education experiences are available. A background in high school agriculture and FFA is also helpful, although not required.

Student Advisement

Students are assigned to the faculty member in agricultural education who will work closely in program planning and in other ways to advise and assist them. Students are encouraged to seek their advisors' help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

LICENSURE

Upon completing this program, teacher candidates are eligible for certification to teach agricultural education in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

For several years, there have been favorable employment opportunities for those prepared to teach agricultural education. Most agricultural education teachers in North Dakota are on extended contracts and receive stipends for serving as an FFA advisor. Other graduates seek employment in Cooperative Extension, farming, agricultural finance, agribusiness, and government agencies in agriculture, or continue their studies at the graduate level.

Collegiate FFA Chapter

The primary purpose of the Collegiate FFA Chapter is to prepare graduates in agricultural education to serve as advisors of secondary FFA chapters. Teacher candidates majoring in agricultural education are encouraged to participate actively in the activities of the NDSU Collegiate FFA Chapter.

Financial Aid and Scholarships

Students seeking financial aid should contact the Office of Financial Aid and Scholarships or One Stop. To inquire about scholarship opportunities, contact the Office of Admission. The College of Agriculture, Food Systems, and Natural Resources; the College of Human Sciences and Education, and the North Dakota FFA Foundation offer scholarships ranging from \$500-\$1,000.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
AGRI 189		1 ANSC 223	2
ANSC 114		3 ASM 125	3
ENGL 110		3 CHEM 117 or 121	3
HNES 100 or 111		2 CHEM 117L or 121L	1
PLSC 110		3 ECON 201	3
STAT 330		3 ENGL 120	3

Second Year			
Fall	Credits	Spring	Credits
AGEC 242		3 EDUC 322	3
EDUC 321		3 COMM 110	3
H&CE 232		3 ANSC Elective	3
BIOL Course plus Lab		4 Humanities & Fine Arts Gen Ed	3
Social & Behavioral Science Gen. Ed.		3 PLSC Elective	3
Complete Core Academic Skills test or access your ACT+ scores		Apply to the School of Education	
		16	15
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 EDUC 489	3
H&CE 444		3 H&CE 480	3
PLSC 210		3 IME 335	3
PLSC 211		1 SOIL 210	3
ASM/Engineering Elective		3 ASM/Engineering Elective	3
Humanities & Fine Arts Gen Ed		3 ENGL Upper Division Requirement	3
		16	18
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 486		3 H&CE 483	1
H&CE 481		3 H&CE 487	9
AGEC Elective		3 H&CE 488	3
ANSC Elective		3	
AGRI Elective		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
		15	13

Total Credits: 123

Agricultural Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agricultural-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/agricultural-education/#planofstudytext>)

Major Requirements

Major: Agriculture Education

Degree Type: B.S.

Minimum Degree Credits to Graduate: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

The Agricultural Education Requirements also includes those courses listed in the General Education categories of Science and Technology and Social & Behavioral Sciences.

Code	Title	Credits
Agriculture Education Requirements		
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 324	Writing in the Sciences	
or ENGL 320	Business and Professional Writing	
or ENGL 459	Researching and Writing Grants and Proposal	
STAT 330	Introductory Statistics	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
or ECON 202	Principles of Macroeconomics	

BIOL 124 & BIOL 100L or BIOL 111 & BIOL 100L	Environmental Science and Non-Majors Biology Lab Concepts of Biology and Non-Majors Biology Lab	4
Select one of the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Teaching Specialty Requirements		
AGEC 242	Introduction to Agricultural Management	3
AGEC	Ag Econ Electives	3
ASM 125	Fabrication & Construction Technology	3
Ag Systems/Engineering Electives	May select courses from ASM, ABEN, CME with advisor approval	6
IME 335	Welding Technology	3
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC	Animal Science Electives	6
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 210	Introduction to Soil Science	3
PLSC or SOIL	Plant Science or Soil Science Elective	3
Agriculture Elective		3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 232	Philosophy and Policy (of CTE)	3
H&CE 444	Planning the Community Program in Agricultural Education	3
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	3
H&CE 481	Methods of Teaching Agriculture	3
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		99

Degree Requirements and Notes

- See School of Education website for admission requirements
- Courses taken P/F may not be used to satisfy any requirements
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework are required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework are required, as well as completing the Praxis Subject test and the Principles of Learning and Teaching Test.

Agricultural and Biosystems Engineering

Department Information

- **Department Location:**
Agricultural and Biosystems Engineering

- **Department Phone:**
701-231-7261
- **Department Email:**
ndsu.aben@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.A.B.En.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-biosystems-engineering/>)

The Agricultural and Biosystems Engineering (ABEN) program prepares students for careers in:

- Machine Systems Engineering – for mechanical equipment and power units such as tractors and other equipment
- Process Engineering – for food, feed, fiber, biofuels, and other bioproducts
- Natural Resources and Environmental Systems Engineering – for soil, water, air, waste, and other areas

Graduates design machines, processes, and natural resource systems. They solve problems using mathematics and applying physical, biological and engineering sciences. Agricultural and biosystems engineers address society's challenges in food, energy and water.

The Program

Agricultural and biosystems engineers are uniquely qualified to use their knowledge of mathematics, biological and physical sciences, and engineering principles to solve problems relating to the:

- design, testing and production of machine systems
- production, handling and processing of crops and biological materials for food, feed, fiber and fuel
- building environmental design
- utilization and conservation of natural resources
- protection of the environment

A major in Agricultural and Biosystems Engineering can serve a broad range of career interests and can provide excellent career opportunities for students from diverse backgrounds.

The program leading to the Bachelor of Science in Agricultural and Biosystems Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org. Agricultural and biosystems engineering students are well-qualified for and encouraged to take the national Fundamentals of Engineering examination. This is the first step in the process of registration as a professional engineer.

Agricultural and Biosystems Engineering integrates engineering topics, engineering design and biological sciences in a single program with two concentrations: Agricultural Engineering and Biosystems Engineering.

ABEN class size is usually fewer than 25 students, which allows for close faculty-student interactions. Student advising for classes and career planning takes place in one-to-one meetings between a student and her or his faculty adviser, and complemented by a student support professional in the department.

Internships

Although not required by the curriculum, students are strongly encouraged to take advantage of paid internships, which allow students to spend a summer or, more typically, a summer and a semester doing engineering work. There are also opportunities to work as a research assistant in projects conducted by faculty. The intern and research assistant positions help students gain hands-on experience in engineering and open doors for employment upon graduation.

Career Opportunities

Position titles of graduates for both concentrations may include design engineer, test engineer, project engineer, plant engineer, quality control engineer, process engineer, energy adviser, consulting engineer and environmental engineer. Starting salaries are among the highest of all college graduates and are comparable to those in other fields of engineering. Recent starting salaries range from \$55,000 to \$75,000 per year with an average of \$60,000 per year. The placement of graduates has been at or near 100 percent for many years.

Agricultural Engineering Concentration

Career opportunities for graduates in agricultural engineering are numerous and diverse. Graduates are employed by companies and agencies that:

- design, develop, test and manufacture agricultural power and machine systems;
- develop electrical and electronic applications for agricultural problems.
- handle, store, process and enhance or protect the quality of agricultural commodities and processed products;
- design environmental control and housing systems for plant and animal production;
- design equipment and systems for processing, manufacturing, distribution and quality protection of food products;
- manage air, land and water resources; and
- design and manage irrigation, drainage, and agricultural waste management systems.

Graduates with an agricultural engineering concentration may also pursue graduate degrees in areas such as engineering, business or law.

Biosystems Engineering Concentration

Graduates in biosystems engineering integrate engineering, biology and chemistry in a variety of applications. Graduates are working in companies and agencies that:

- convert bio-based resources to food, feed, fuel and other renewable products;
- design new generations of devices or systems for biological systems;
- control biological systems for natural resource protection, waste remediation and ecosystem restoration;
- manage air, land and water resources;
- create new and improved processes through the innovative use of microorganisms, plant and animal cells and enzymes; and
- develop sensors, control systems and computer models to monitor and control biological processes.

Graduates with a biosystems engineering concentration may also pursue an advanced degree in engineering, medicine, veterinary medicine, management or law.

Scholarships

Several Departmental, College of Engineering, and NDSU scholarships are competitively awarded to students in the ABEN program each spring. There are scholarships for freshmen who apply for the ABEN program. The departmental scholarships range in value from about \$500 to \$4,000. Scholastic achievement, financial need and extracurricular activities are considered. Scholarships are provided by industry, faculty and alumni.

Extra-Curricular Activities

Varied extracurricular programs are available to students majoring in Agricultural and Biosystems Engineering. Students are involved with the International ¼ Scale Tractor Student Design Competition, North Dakota Student Engineering Branch of the American Society of Agricultural and Biological Engineers, and the Society of Women Engineers.

A Well-Equipped Teaching Facility

Laboratories are furnished with equipment used in industry and research. Computer labs have specialized software used in engineering such as Creo, ANSYS, ArcGIS, and AutoCAD. Most courses include labs where students get hands-on experience with data acquisition systems, analytical tools, biomaterials handling and processing equipment, environmental measurement equipment, controllers, and analog and digital test equipment.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ABEN 110		3 ABEN 496 (Ag Tech Expo)	1
CHEM 121		3 ME 212	3
ENGL 110		3 ME 221	3
MATH 165		4 CHEM 122	3
CHEM/BIO Elective		3 ENGL 120	3
		MATH 166	4

Sophomore			
Fall	Credits	Spring	Credits
ABEN 255		3 ABEN 263	3
COMM 110		3 PHYS 252	4
ME 222		3 PHYS 252L	1
ME 223		3 MATH 266	3
MATH 259		3 ME 350	3
MATH 128		1 Computer Elective	3
Gen Ed Elective		2	
		18	17
Junior			
Fall	Credits	Spring	Credits
IME 460		3 ABEN 377	3
CE 309		3 ABEN 391	1
ENGL 321, 324, or 459		3 ABEN 482	3
ENGR 402		1 ECE 301	3
ABEN Elective		3 ABEN Elective	3
CHEM/BIO Elective		3 Gen Ed Elective	3
		16	16
Senior			
Fall	Credits	Spring	Credits
ABEN 486		2 ABEN 487	2
IME 440		2 Tech Elective	3
ABEN Elective		3 CHEM/BIO Elective	3
Gen Ed Elective		3 Gen Ed Elective	3
Tech Elective		5 Gen Ed Elective	3
		BUS/COMM Elective	3
		15	17
Total Credits: 132			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ABEN 110		3 ABEN 496 (Ag Tech Expo)	1
CHEM 121		3 ME 221	3
CHEM 121L		1 CHEM 122	3
ENGL 110		3 CHEM 122L	1
MATH 165		4 ENGL 120	3
BIOL 150		3 MATH 166	4
		Computer Elective	3
		17	18

Sophomore			
Fall	Credits	Spring	Credits
ABEN 255		3 ABEN 263	3
CHEM 240		3 PHYS 252	4
COMM 110		3 PHYS 252L	1
MATH 128		1 MATH 266	3
MATH 259		3 Gen Ed Elective	3
ME 222		3 CHEM/BIO Elective	3
		16	17
Junior			
Fall	Credits	Spring	Credits
CE 309		3 ABEN 391	1
IME 440		2 ABEN 444	3
IME 460		3 ABEN 482	3
ENGL 321, 324, or 459		3 ME 350	3
ENGR Elective		3 ABEN Elective	3
CHEM/BIO Elective		3 Gen Ed Elective	5
		17	18
Senior			
Fall	Credits	Spring	Credits
ABEN 486		2 ABEN 487	2
ENGR 402		1 ABEN Elective	3
ABEN Elective		3 ENGR Elective	3
Gen Ed Elective		3 Gen Ed Elective	3
ENGR Elective		3 Tech Elective	3
Tech Elective		3	
		15	14
Total Credits: 132			

Agricultural and Biosystems Engineering

Department Information

- **Department Location:**
Agricultural and Biosystems Engineering
- **Department Phone:**
701-231-7261
- **Department Email:**
ndsu.asm@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.A.B.En.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agricultural-biosystems-engineering/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/agricultural-biosystems-engineering/>)

Major Requirements

Major: Agricultural & Biosystems Engineering Option: Agricultural

Degree Type: B.S.A.B.En

Minimum Degree Credits to Graduate: 133

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements - Agricultural Option

Code	Title	Credits
ABEN Core Courses:		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	3
ABEN 391	Seminar	1
ABEN 482	Instrumentation & Measurements	3
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
ABEN 496	Field Experience	1

ABEN 300-400 Electives: Select 9 credits from the following:

9

ABEN 358	Electric Energy Application in Agriculture	
ABEN 383	Structural Design for Biosystems	
ABEN 444	Transport Processes	
ABEN 450	Bioprocess Engineering	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN 479	Fluid Power Systems Design	
ABEN 484	Drainage and Wetland Engineering	
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3
CE 309	Fluid Mechanics	3
or ME 352	Fluid Dynamics	
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECE 301	Electrical Engineering I	3
Select one from the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
or STAT 330	Introductory Statistics	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5

Program Electives: 23

Select the following program electives in each category from courses listed in the corresponding Program Electives Tab. Minimum credit in each category below will apply. A minimum of 9 Adv. Bioscience credits (at least 3 credits non-ABEN) are required as part of these 23 program electives.

Computer Electives	Select a minimum of 3 credits from the Program Electives Tab.
Business or Communication Elective	Select a minimum of 3 credits from the following prefix options: BUSN, COMM, ACCT, AGECE, ECON, MGT, MIS, MRKT ²
Chemistry/Biological Science Electives	Select a minimum of 9 credits from the Program Electives Tab.
Technical Electives	Select a minimum of 8 credits from the Program Electives Tab.

Total Credits**109**

² The course used for this business or communication elective cannot double-count as General Education.

SUGGESTED EMPHASIS AREA for the Agricultural Engineering Option: Consult with adviser when making selections.

- **Agricultural Systems** - Select electives with emphasis on machine, power, structural, and electrical/electronic systems to solve problems involving engineering aspects of food, feed, and fiber production.
- **Environmental Systems** - Select electives with emphasis on areas that contribute to solving problems in environmental engineering, natural resources management, hydrology, irrigation, watershed management, and waste management.
- **Biomaterial Systems** - Select electives with emphasis on combining engineering, biological, and physical sciences in the application of engineering principles to handling and processing of biomaterials for food and non-food products.

Degree Requirements for the Accelerated M.S. Program in Agricultural and Biosystems Engineering

Students pursuing an accelerated master's degree in ABEN must complete the following requirements:

- 30 credits after the B.S. is required. However, a maximum of 15 graduate credits earned during the combined/accelerated degree program may also be counted toward the graduate degree.
- 20-24 credits are from didactic course work, while 6-10 credits are typically devoted for a master's thesis based on research
- A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required.
- ABEN Graduate Seminar (ABEN 790).

Major Requirements

Major: Agricultural & Biosystems Engineering Option: Biosystems

Degree Type: B.S.A.B.En

Minimum Degree Credits to Graduate: 133

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements - Biosystems Option

Code	Title	Credits
ABEN Core Requirements:		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	3
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 391	Seminar	1
ABEN 444	Transport Processes	3
ABEN 482	Instrumentation & Measurements	3
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
ABEN 496	Field Experience	1
ABEN 300-400 Electives: Select 9 credits from the following:		9
ABEN 358	Electric Energy Application in Agriculture	
ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	
ABEN 450	Bioprocess Engineering	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN/ME 479	Fluid Power Systems Design	
ABEN 484	Drainage and Wetland Engineering	
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 350	Thermodynamics and Heat Transfer	3
BIOL 150	General Biology I	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 240	Survey of Organic Chemistry	3
CE 309	Fluid Mechanics	3
Select one from the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3

or STAT 330	Introductory Statistics	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5

Program Electives: **24**

Select the following program electives in each category from courses listed in the corresponding Program Electives Tab. Minimum credit in each category below will apply. A minimum of 9 Adv. Bioscience credits (at least 3 credits non-ABEN) are required as part of these 24 program electives.

Engineering Electives	Select a minimum of 9 credits from the Program Electives Tab.
Chemistry/Biological Science Electives	Select a minimum of 6 credits from the Program Electives Tab.
Technical Electives	Select a minimum of 6 elective courses from the Program Electives Tab.
Computer Elective	Select a minimum of 3 credits from the Program Electives Tab.

Total Credits **109**

Program Electives for the Agricultural and Biosystems Engineering - Agricultural Option

Code	Title	Credits
Computer Electives: Select one course from the following:		3

CE 212	Civil Engineering Graphic Communications
CSCI 122	Visual BASIC
CSCI 160	Computer Science I
ECE 173	Introduction to Computing
GEOG 105	Fundamentals of Geographic Information Systems
GEOG 455	Introduction to Geographic Information Systems
IME 380	CAD/CAM for Manufacturing
ME 213	Modeling of Engineering Systems

Code	Title	Credits
Business or Communication Electives: Choose one of the following courses or a course from the following prefix options:		3

BUSN, COMM, ACCT, AGECE, ECON, MGT, MIS, MRKT (The course used for this elective cannot double-count as General Education)	
ACCT 102	Fundamentals of Accounting
ACCT 200	Elements of Accounting I
AGECE 242	Introduction to Agricultural Management
AGECE 244	Agricultural Marketing
AGECE 246	Introduction to Agricultural Finance
COMM 212	Interpersonal Communication
COMM 216	Intercultural Communication
COMM 260	Introduction to Web Design
ECON 201	Principles of Microeconomics
ECON 202	Principles of Macroeconomics

Code	Title	Credits
Chemistry/Biological/Environmental Science Electives: Select 9 credits from the following:		9

ASM 264	Natural Resource Management Systems
ANSC 220	Livestock Production
BIOL 100L	Non-Majors Biology Lab
BIOL 111	Concepts of Biology
BIOL 124	Environmental Science
BIOL 150	General Biology I
BIOL 150L	General Biology I Laboratory
BIOL 151	General Biology II
BIOL 151L	General Biology II Laboratory
CFS 210	Introduction to Food Science and Technology
CFS 370	Food Processing I
CFS 450	Cereal Technology

CHEM 121L	General Chemistry I Laboratory
CHEM 122L	General Chemistry II Laboratory
CHEM 240	Survey of Organic Chemistry
ENT 210	Insects, Humans and the Environment
MICR 202	Introductory Microbiology
MICR 202L	Introductory Microbiology Lab
MICR 350	General Microbiology
MICR 350L	General Microbiology Lab
NRM 322	Environmental Law and Policy
PLSC 110	World Food Crops
PLSC 215	Weed Identification
PLSC 225	Principles of Crop Production
PLSC 315	Genetics
PLSC 320	Principles of Forage Production
PLSC 323	Principles of Weed Science
PLSC 335	Seed Technology & Production
RNG 225	Natural Resource & Agro-Ecosystems
SOIL 210	Introduction to Soil Science
SOIL 217	Introduction to Meteorology & Climatology
SOIL 410	Soils and Land Use

Code	Title	Credits
Technical Electives: May choose from the ABEN section, Chemistry/Biological Science electives, Computer electives, or the Engineering electives listed below:		8

ABEN 496 - Ag Tech Expo (1 add'l cr.) may be used as a Technical Elective. ABEN 496 - Field Exp./Internship, 1 cr., may be used as an ABEN Elective or as a Technical Elective. A maximum of two credits of ABEN 496 FE/Internship may be counted towards degree requirements.

ASM 323	Post-Harvest Technology
ASM 373	Tractors & Power Units
ASM 374	Power Units Laboratory
ASM 378	Machinery Principles and Management
ASM 429	Hydraulic Power Principles and Applications
ASM 454	Principles and Application of Precision Agriculture
CE 204	Surveying
CE 310	Fluid Mechanics Laboratory
CE 343	Structural Engineering and Analysis
CE 370	Introduction to Environmental Engineering
CE 371	Environmental Engineering Laboratory
CE 404	Reinforced Concrete
CE 408	Water Resources and Supply
CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 473	Air Pollution
CE 477	Applied Hydrology
CE 478	Water Quality Management
CE 479	Advanced Water and Wastewater Treatment
CE 483	Contracts and Specifications
ECE 275	Digital Design
ECE 303	Electrical Engineering II
ECE 376	Embedded Systems
GEOG 455	Introduction to Geographic Information Systems
GEOG 456	Advanced Geographic Information Systems
IME 330	Manufacturing Processes
IME 335	Welding Technology

IME 380	CAD/CAM for Manufacturing
IME 430	Process Engineering
IME 431	Production Engineering
IME 450	Systems Engineering and Management
IME 456	Program and Project Management
IME 461	Quality Assurance and Control
ME 331	Materials Science and Engineering
ME 353	Thermodynamics II
ME 421	Theory of Vibrations
ME 442	Machine Design I
ME 454	Heat and Mass Transfer
ME 471	Experimental Stress Analysis
ME 473	Engineering with Polymeric Materials
ME 474	Mechanics of Composite Materials
ME 475	Automatic Controls
ME 487	Internal Combustion Engines
STAT 461	Applied Regression Models
STAT 462	Introduction to Experimental Design

Total Credits**8****SUGGESTED EMPHASIS AREA for the Agricultural & Biosystems Engineering Option: Consult with adviser when making selections.**

- Agricultural Systems - Select electives with emphasis on machine, power, structural and electrical/electronic systems to solve problems involving engineering aspects of food, feed, and fiber production.
- Environmental Systems - Select electives with emphasis on areas that contribute to solving problems in environmental engineering, natural resources management, hydrology, irrigation, watershed management, and waste management.
- Biomaterial Systems - Select electives with emphasis on combining engineering, biological, and physical sciences in the application of engineering principles to handling and processing of biomaterials for food and non-food products.
- Advance Biosciences Electives - 9 credits required. Double Count with electives above. A minimum of 3 credits must be from non-ABEN prefix courses in the Advanced Biosciences tab.

Code	Title	Credits
AGRICULTURAL SYSTEMS		
ABEN 358	Electric Energy Application in Agriculture	
ABEN 444	Transport Processes	
ABEN 452	Bioenvironmental Systems Design	
ABEN 456	Biobased Energy	
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	
ABEN 464	Resource Conservation and Irrigation Engineering	
ABEN 473	Agricultural Power	
ABEN 478	Machinery Analysis & Design	
ABEN 479	Fluid Power Systems Design	
ASM 323	Post-Harvest Technology	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
ASM 454	Principles and Application of Precision Agriculture	
CE 343	Structural Engineering and Analysis	
CE 404	Reinforced Concrete	
ECE 275	Digital Design	
ECE 303	Electrical Engineering II	
ECE 376	Embedded Systems	
GEOG 455	Introduction to Geographic Information Systems	

GEOG 456	Advanced Geographic Information Systems
IME 330	Manufacturing Processes
IME 335	Welding Technology
IME 380	CAD/CAM for Manufacturing
IME 430	Process Engineering
IME 431	Production Engineering
IME 450	Systems Engineering and Management
IME 456	Program and Project Management
IME 461	Quality Assurance and Control
ME 331	Materials Science and Engineering
ME 353	Thermodynamics II
ME 421	Theory of Vibrations
ME 442	Machine Design I
ME 454	Heat and Mass Transfer
ME 471	Experimental Stress Analysis
ME 473	Engineering with Polymeric Materials
ME 474	Mechanics of Composite Materials
ME 475	Automatic Controls
ME 487	Internal Combustion Engines
ENVIRONMENTAL SYSTEMS	
ABEN 358	Electric Energy Application in Agriculture
ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy
ABEN 464	Resource Conservation and Irrigation Engineering
ABEN 479	Fluid Power Systems Design
ABEN 484	Drainage and Wetland Engineering
ASM 454	Principles and Application of Precision Agriculture
CE 204	Surveying
CE 370	Introduction to Environmental Engineering
CE 371	Environmental Engineering Laboratory
CE 408	Water Resources and Supply
CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 473	Air Pollution
CE 477	Applied Hydrology
CE 478	Water Quality Management
CE 479	Advanced Water and Wastewater Treatment
CE 483	Contracts and Specifications
CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341 L	Organic Chemistry I Laboratory
ECE 303	Electrical Engineering II
ME 454	Heat and Mass Transfer
MICR 350	General Microbiology
SOIL 210	Introduction to Soil Science
SOIL 410	Soils and Land Use
BIOMATERIAL SYSTEMS	
ABEN 358	Electric Energy Application in Agriculture
ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy

ABEN 458	Process Engineering for Food, Biofuels and Bioproducts
ABEN 479	Fluid Power Systems Design
ABEN 479	Fluid Power Systems Design
ABEN 484	Drainage and Wetland Engineering
BIOC 460	Foundations of Biochemistry and Molecular Biology I
BIOC 460L	Foundations of Biochemistry I Laboratory
CFS 210	Introduction to Food Science and Technology
CFS 430	Food Unit Operations
CFS 450	Cereal Technology
CFS 470	Food Processing II
CFS 471	Food Processing Laboratory
CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
ECE 303	Electrical Engineering II
IME 450	Systems Engineering and Management
IME 460	Evaluation of Engineering Data
IME 461	Quality Assurance and Control
ME 331	Materials Science and Engineering
ME 442	Machine Design I
ME 454	Heat and Mass Transfer
MICR 350	General Microbiology

Code	Title	Credits
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Advanced Biosciences Electives - 9 credits required. Students may double count with other program electives. A minimum of 3 credits must be from non-ABEN prefix courses in the Advanced Biosciences tab.

ABEN Courses (Eligible for Adv. Biosci.)

ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts
ABEN 464	Resource Conservation and Irrigation Engineering
ABEN 484	Drainage and Wetland Engineering

SOIL Courses

SOIL 322	Soil Fertility and Fertilizers
SOIL 351	Soil Ecology
SOIL 410	Soils and Land Use
SOIL 444	Soil Genesis and Survey
SOIL 465	Soil And Plant Analysis

PLSC Courses

PLSC 320	Principles of Forage Production
PLSC 335	Seed Technology & Production
PLSC 350	Sugarbeet Production
PLSC 411	Genomics
PLSC 431	Intermediate Genetics

Additional Course Options

BIOL 364	General Ecology
ANSC 357	Animal Genetics
RNG 452	Managing Natural and Rangeland Resources using GIS

Code	Title	Credits
Engineering Electives: Select 9 credits from the following:		9
CE 310	Fluid Mechanics Laboratory	
CE 370	Introduction to Environmental Engineering	
CE 371	Environmental Engineering Laboratory	
ECE 301	Electrical Engineering I	
ME 223	Mechanics of Materials	
ME 331	Materials Science and Engineering	
Chemistry/Biological Science Electives: Select 6 credits from the following:		6
ANSC 357	Animal Genetics	
ANSC 463	Physiology of Reproduction	
BIOC 260	Elements of Biochemistry	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
BIOL 150L	General Biology I Laboratory	
BIOL 151	General Biology II	
BIOL 151L	General Biology II Laboratory	
BIOL 220	Human Anatomy and Physiology I	
BIOL 315	Genetics	
BIOL 315L	Genetics Laboratory	
BIOL 364	General Ecology	
CFS 210	Introduction to Food Science and Technology	
CFS 370	Food Processing I	
CFS 450	Cereal Technology	
CHEM 341	Organic Chemistry I	
CHEM 341L	Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
CHEM 342L	Organic Chemistry II Laboratory	
MICR 202	Introductory Microbiology	
MICR 202L	Introductory Microbiology Lab	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
MICR 352	General Microbiology II	
MICR 352L	General Microbiology Lab II	
MICR 452	Microbial Ecology	
Technical Electives: Select 6 credits from ABEN Electives, Engineering Electives, Chem/Bio Electives, or Computer Electives.		6
ABEN 496 - Ag Tech Expo (1 add'l cr.) may be used as a Technical Elective. ABEN 496 - Field Exp./Internship, 1 cr., may be used as an ABEN Elective or as a Technical Elective. A maximum of two credits of ABEN 496 FE/Internship may be counted towards degree requirements.		
Computer Elective: Select 3 credits from the following:		3
CE 212	Civil Engineering Graphic Communications	
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
GEOG 455	Introduction to Geographic Information Systems	
IME 380	CAD/CAM for Manufacturing	
ME 212	Fundamentals of Visual Communication for Engineers	
ME 213	Modeling of Engineering Systems	

Total Credits	24
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Code	Title	Credits
Advanced Biosciences Electives - 9 credits required. Students may double count with other program electives. A minimum of 3 credits must be from non-ABEN prefix courses in the Advanced Biosciences tab.		

ABEN Courses (Eligible for Adv. Biosci.)

ABEN 444	Transport Processes
ABEN 452	Bioenvironmental Systems Design
ABEN 456	Biobased Energy
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts
ABEN 464	Resource Conservation and Irrigation Engineering
ABEN 484	Drainage and Wetland Engineering

Engineering Electives (Eligible for Adv. Biosci.)

CE 370	Introduction to Environmental Engineering
CE 371	Environmental Engineering Laboratory

CHEM/BIO Electives (Eligible for Adv. Biosci.)

ANSC 357	Animal Genetics
BIOC 260	Elements of Biochemistry
BIOC 473	Methods of Biochemical Research
BIOC 474	Methods of Recombinant DNA Technology
BIOL 364	General Ecology
CHEM 240	Survey of Organic Chemistry
CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
CHEM 342L	Organic Chemistry II Laboratory
MICR 350	General Microbiology
MICR 350L	General Microbiology Lab
MICR 352	General Microbiology II
MICR 352L	General Microbiology Lab II
MICR 452	Microbial Ecology

Agricultural Communication

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agricultural-communication/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/agricultural-communication/#planofstudytext>)

Major Requirements

Major: Agricultural Communication

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework with a minimum GPA of 3.00 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Agricultural Communication Major:		
COMM 101	Majors and Careers in Communication	1
COMM 133	Introduction to Agricultural Communication	3
COMM 200	Introduction to Media Writing	3
COMM 310	Advanced Media Writing	3
COMM 320	Communication Research Methods	3
COMM 362	Principles of Design For Media	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media (Capstone)	3
COMM 496	Field Experience	3
Select one of the following for the upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives:		15
COMM 216	Intercultural Communication	
COMM 245	Principles of Broadcast Production	
COMM 308	Business and Professional Speaking	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 375	Principles of Strategic Communication	
COMM 445	Advanced Broadcast Production	
COMM 450	Issues in Communication	
COMM 470	Research for Strategic Communication	
COMM 485	Risk and Crisis Communication	
AGEC 242	Introduction to Agricultural Management	
AGEC 244	Agricultural Marketing	
AGEC 350	Agrisales	
CFS 200	Introduction to Food Systems	
EMGT 101	Emergencies, Disasters, and Catastrophes	
Minor Requirement:		16
Students are required to minor in Animal Science, Crop and Weed Science, Equine Science, Food Safety, Natural Resource Management, Range Science, or Soil Science.		
Total Credits		77

Minor Notes:

- Student enrollment is limited to one degree program offered by the Department of Communication.

Minor Requirements**Minor: Agricultural Communication**

Required Credits: 21

Minor Requirements

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 133	Introduction to Agricultural Communication	3
COMM 200	Introduction to Media Writing	3
Professional Specialization Electives:		12
COMM 245	Principles of Broadcast Production	
COMM 308	Business and Professional Speaking	
COMM 310	Advanced Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	
COMM 375	Principles of Strategic Communication	
COMM 465	Convergence Media	
COMM 470	Research for Strategic Communication	
COMM 485	Risk and Crisis Communication	
Total Credits		21

Minor Requirements and Notes

- Students must earn a minimum GPA of 2.75 in courses applied to the minor.
- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Agricultural Communication

Department Information

- **Department Location:**
Minard Hall 338
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-communication/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-communication/>)

Agricultural Communication is one of four programs in the Department of Communication. This course of study is for students who have strong interests in both agriculture and communication. Our graduates work as communication specialists for a variety of agribusinesses. Students might work for a livestock or grain association, as an editor of a specialized publication, or as an advocate for a farming or ranching organization.

Why Choose a Major in the Department of Communication?

Our students pursue degrees in Communication because they are interested in fast-paced careers where every day brings something new. They want to make a difference in the world while doing something they love – whether that's reporting breaking news, designing advertisements, running social media campaigns, promoting organizations, or leading others in the workplace.

You will get:

- **More time to explore your interests.** We give you the first year to explore your options, making it possible to switch between **four different COMM majors** without extending your graduation timeline.
- **Guidance on choosing a career.** In COMM 101: Majors and Careers in Communication, you will meet others in your major, learn more about possible careers, and find campus resources that help you achieve your professional goals.
- **Hands-on learning.** You'll have multiple ways to apply what you are learning through course projects, consulting for local organizations, and participating in national competitions.
- **Built-in communities.** You can connect with other students - while building your resume - through the **eight student organizations** affiliated with our department.
- **Professional experience.** We help you find and benefit from internships in your field through our relationships with local and regional employers.

Agricultural Communication Major

The agricultural communication major combines the resources and expertise of two units, communication and agriculture, to produce trained communicators who can explain science, technologies, and complex agricultural issues to diverse audiences. Students will complete an applied capstone course in their final semester. Students majoring in agricultural communication may earn a Bachelor of Science degree (includes an approved minor in an agriculture program) or a Bachelor of Arts degree (includes a modern language proficiency).

Admission to the Major

Students complete 18 credits of Pre-Communication courses with a minimum 3.00 GPA to be admitted to the professional program in agricultural communication. These courses include COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for agricultural communication students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with agricultural administrators, private agencies and firms, and governmental officials, among others. Internships often lead to jobs.

Career Opportunities

Coursework in the agricultural communication major prepares students for careers in agricultural and scientific industries, agencies and operations that include scientific writing, agricultural promotion and consulting, and agricultural planning and assessment. The coursework emphasizes written and oral communication skills and prepares students to communicate in meaningful and effective ways to a variety of audiences.

Extra-Curricular Activities

Students majoring in agricultural communication are encouraged to be active members of Agricultural Communicators of Tomorrow and/or the Saddle and Sirlin Club. They may also be interested in joining Advertising Club or the department's chapter of the Public Relations Student Society of America (PRSSA). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

A well-rounded high school education with experiences in high school music, forensics, theatre, journalism, FFA, or scouting serves as good preparation for the major in agricultural communication. Students with interests in science and art, business and service, and publicity and promotion will find a major in this department to be a good fit.

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit the department website (<https://www.ndsu.edu/communication/scholarships/>) for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research. We encourage students who want to learn more about Agricultural Communication to reach out via email or schedule an appointment via Navigate (<https://www.ndsu.edu/enrollmentmanagement/navigate/login/>).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 101		1 COMM 110	3
COMM 112		3 COMM 133	3
COMM 114		3 ENGL 120	3
ENGL 110 (or placement into ENGL 120)		3 Humanities/Arts GE	3
Quantitative Reasoning GE		3 Science/Technology GE	3
Wellness GE		2 Science/Technology Lab GE	1
		15	16
Second Year			
Fall	Credits	Spring	Credits
COMM 212		3 COMM 200	3
COMM 220		3 COMM 320	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Global Perspectives GE		3 Humanities/Arts GE	3
Science/Technology GE		3 Science/Technology GE	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
COMM 310		3 COMM 362	3
COMM 496		3 Major Elective	3
Major Elective		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Upper Division Writing		3 AHSS Requirement	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
COMM 431		3 COMM 465	3
Major Elective		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
AHSS Requirement		3 AHSS Requirement	3
Additional Coursework or Internship		3 Additional Coursework May Be Required to Reach 120 Credits	2
		15	14

Total Credits: 120

Agricultural Economics

Department Information

- **Department Location:**
Richard H. Barry Hall 500
- **Department Phone:**
701-231-7441
- **Department Email:**
ndsu.agribusiness@ndsu.edu
- **Department Web Site:**

www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)

- **Credential Offered:**

B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-economics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-economics/>)

Agricultural economics combines the technical aspects of agriculture with the business aspects of management, marketing, and finance. Students are prepared for a wide variety of exciting careers in the marketing of commodities sold and inputs purchased by agricultural producers; agricultural finance; and management of agribusinesses, farms and ranches. In addition, many graduates pursue successful careers in government service, economic development, commodity promotion and agricultural policy analysis.

The Program

The agricultural economics program emphasizes decision making, technical expertise and communication with a focus on agriculture and the food industry. Students are trained to be decision makers through course work and practical experience in agriculture, analytical and communication skills, team building, economic theory and agricultural policy.

The agricultural economics program is flexible. Students may complement required courses with classes from within the Department of Agribusiness and Applied Economics, as well as from other programs across campus. Students planning careers in production agriculture are encouraged to enroll in courses in crop and livestock sciences, agricultural systems or other production-oriented courses within the college. Students wanting careers in the food industry may select courses in food science and food safety, transportation or business. Students wishing to work in agricultural education, communication or extension can add courses in production agriculture, education or communication to their programs. By working with their academic advisor, agricultural economics students can identify courses that allow them to pursue interests in renewable energy, risk management, rural economic development, finance and natural resource management. Regardless of student selection of elective courses, the agricultural economics program contains a common core of classes introducing students to economic theory, farm management, agricultural finance, crop and livestock marketing, quantitative methods, and laws and policies important to agriculture.

The Department of Agribusiness and Applied Economics also offers major and minor programs in agribusiness and economics. Students should refer to the agribusiness and economics fact sheets.

The Faculty

The department has 20 faculty members involved in teaching, research and extension. Our faculty have received numerous prestigious teaching and research awards, including the Burlington Northern Foundation Faculty Achievement Award; the Fargo Chamber of Commerce Distinguished Professorship Award; the Chancellor's Award for Academic Leadership; the Western Agricultural Economics Association's Outstanding Educator Award; the Premier Forecaster Award; the Eugene R. Dahl Excellence in Research Award, Senior Faculty; and the Teaching Award of Merit from the National Association of Colleges and Teachers of Agriculture. Faculty expertise varies across a wide range of specialties, including agricultural marketing, production, natural resource management, economic development, trade, finance, cooperatives and agricultural law.

Career Opportunities

Agricultural economics graduates have become loan officers; managers of farm supply, equipment firms and grain elevators; sales representatives with chemical, seed, feed and fertilizer companies; economists with state and federal agencies; and commodity merchandisers. About 30 percent of the graduates choose to farm and ranch. While many graduates remain in North Dakota or Minnesota, others begin careers throughout the nation and the world.

Financial Aid and Scholarships

Several \$500 scholarships are available to outstanding freshmen entering the program each fall semester. Scholarships also are available to transfer students and students already in the agribusiness program at North Dakota State University.

The department annually awards over \$100,000 in scholarships (ranging from \$500 to \$10,500) to students majoring in agribusiness and agricultural economics.

The College of Agriculture, Food Systems, and Natural Resources awards scholarships each year. For more information on scholarships, go to: <https://www.ndsu.edu/admission/scholarships/>.

Student loan, grant and work-study information is available from the Office of Financial Aid and Scholarships or One Stop.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ECON 189 ¹		1 ECON 201	3
ENGL 110		3 ENGL 120	3
MATH 144		4 TL 116	3
Ag Science Elective		3 COMM 110	3
Hum & Fine Arts Gen Ed		3 Sci & Tech Gen Ed	4
		14	16
Sophomore			
Fall	Credits	Spring	Credits
AGEC 242		3 AGECE 244	3
ECON 202		3 AGECE 246	3
STAT 330		3 ECON 341	3
ACCT 200 (or ACCT 102)		3 STAT 331	2
AGEC 339		3 Sci & Tech Gen Ed	3
		ACCT 201 (or free elective)	3
		15	17
Junior			
Fall	Credits	Spring	Credits
AGEC/ECON Elective		3 AGECE/ECON 300/400 Elective (AGECE 344)	3
ECON 343		3 AGECE/ECON 300/400 Elective (AGECE 346)	3
Hum & Fine Arts Gen ed		3 AGECE 300/400 Elective	6
AGECE/ECON Elective (AGECE 342)		3 Ag Sci Elective	3
Upper Level ENGL Gen Ed		3	
		15	15
Senior			
Fall	Credits	Spring	Credits
AGECE 300/400 Elective (AGECE 375)		3 AGECE 300/400 Elective (AGECE 484)	3
Ag Science Elective		3 AGECE/ECON 300-400 Elective	3
Upper Level COMM Elective		3 Free Electives	5
AGECE Capstone		3 Wellness Gen Ed	2
Sci & Tech Gen Ed		3	
		15	13

Total Credits: 120

¹ ECON 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take ECON 189

Agricultural Economics

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-7441

- **Department Web Site:**
www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agricultural-economics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/agricultural-economics/#planofstudytext>)

Major Requirements

Major: Agricultural Economics

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Core Courses for Agricultural Economics		
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3

AGEC 339	Quantitative Methods & Decision Making	3
AGEC 375	Applied Agricultural Law	3
or AGECE 484	Agricultural Policy	
Select one of the following:		3
AGEC 342	Farm and Agribusiness Management II	
AGEC 344	Agricultural Price Analysis	
AGEC 346	Applied Risk Analysis	
Agribusiness & Applied Economics Electives: A minimum of 9 credits of 300-400 AGECE or ECON electives		9
Agriculture Science & Technology:		9
Complete nine (9) credits from two (2) areas in the College of AFSNR other than Agribusiness & Applied Economics. (Includes: ASM, ANSC, ABEN, CFS, ENT, MICR, NRM, PPTH, PLSC, RNG, SOIL & VETS.) EXCEPTION - All 9 credits may be in the same area if a student completes a minor from the College of AFSNR.		
Capstone Experience: Select one of the following: ¹		3
AGEC 420	Integrated Farm and Ranch Management	
AGEC 444	Advanced Commodity Trading	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
Support Area:		
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
Select one of the following:		3-6
ACCT 102	Fundamentals of Accounting	
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	
Additional Requirements for Ag Econ		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take 150.)	1
ECON 189	Skills for Academic Success	1
TL 116	Business Software Applications	3
Select one communication course from the following:		3
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication (May satisfy general education category B/D)	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 383	Organizational Communication I	
MATH 144	Mathematics for Business (or any higher math)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2-3
or ECON 410	Econometrics	
Total Credits		71-75

¹ Students are advised to consider which capstone course they will take by the end of their second year. This planning allows time to complete the required prerequisites for the capstone prior to the senior year.

² AGRI150 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 150.

Degree Requirements and Notes

- Students must earn, at least, a 2.00 cumulative GPA that is based on the courses that satisfy major requirements.
- Students majoring in Agricultural Economics may not pursue minors in either agribusiness or economics.

Agricultural Systems Management

Department Information

- **Department Location:**
Agricultural and Biosystems Engineering
- **Department Phone:**
701-231-7261
- **Department Email:**
ndsusm@ndsusm.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-systems-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/agricultural-systems-management/>)

The agricultural systems management (ASM) program combines an understanding of the agricultural, biological and physical sciences with economics, managerial and technical skills. This understanding of science, systems management and applications of engineering can be applied to a career in the production and processing of food, feed, fiber and fuel, and the marketing, sales and distribution of agricultural products and services.

The Program

The ASM major in the College of Agriculture, Food Systems, and Natural Resources is administered by the Department of Agricultural and Biosystems Engineering. The ASM program leads to a Bachelor of Science degree and includes core requirements in mathematics, communications, sciences, humanities and social sciences. In the major, students complete technical systems courses in machine principles, power systems, computer applications, materials handling, site specific agriculture, environmental resources management, electrical systems and electronics, and information/decision support technology. The curriculum balances hands-on knowledge of technology with instruction in agricultural sciences and agribusiness principles. A degree is awarded after completion of a minimum of 120 credits.

The ASM curriculum has the flexibility to permit individuals from both rural and urban backgrounds to develop a program to meet personal career objectives. Minors may be developed in related fields of production agriculture, agribusiness or in fields that add curriculum diversity, e.g., international studies, communication, natural resources management, business administration, accounting, or industrial management.

ASM students are encouraged to consider practical work experience during their college program. Cooperative Education provides opportunities for students to gain valuable career related experience.

Career Opportunities

The opportunities for ASM graduates are many and diverse. Graduates may, for example:

1. Be employed by companies and agencies providing inputs and technical services for agricultural production:
 - Business Manager, Titan Machinery
 - Loan Officer, National Bank of Harvey
 - Territory After Market Manager, Deere and Company
 - Irrigation Sales and Service, Reinke Manufacturing Co.
 - Parts Manager, RDO Equipment
 - Precision Ag Specialist, Precision Partners
 - District Sales Manager, Interstate Seed Co.
2. Work with agribusiness companies and agencies that handle, store, process and distribute agricultural products and foods:
 - Station Manager, Pioneer Hi-Bred International
 - Petroleum Sales Specialist, Cenex/Land O'Lakes
 - Elevator Manager, ADM
 - Production Management, Black Gold Farms
 - Crop Consultant, Triangle Agronomy
3. Work with companies and agencies providing inputs and technical services to rural and urban communities and the general society:

- CEO, Cass County Electric
- Ag Science Teacher, North Central Schools
- Soil Conservationist, USDA or
- Natural Resources Conservation Service
- Farm Appraiser, Farm Credit Services
- Energy Use Advisor, Verendrye Electric Cooperative
- Water Quality Specialist, USDA or Extension Service

4. Be self-employed, performing services as consultants, or as owners or operators of businesses:

- Owner, Credit Management Consulting
- Owner, Lynnes Bison Farms
- Owner, Hoffman Irrigation
- Owner, Rust Sales

Scholarships

Several scholarships are available through the department. These scholarships range from \$300 to \$4,000. Students also may be eligible for scholarships from the College of Agriculture, Food Systems, and Natural Resources.

Extra-Curricular Opportunities

The ASM Club offers students opportunities to participate in professional and social activities with other students at the local, regional and national levels. ASM Club members take an active part in the annual Agricultural Technology Expo, go on field trips and are involved in public service activities. Being an active participant in student organizations helps students develop leadership, teamwork, organization and communication skills. These skills are highly sought by those industries that hire ASM graduates.

A Well-Equipped Teaching Facility

The ASM degree program is housed in the Agricultural and Biosystems Engineering building which includes offices, classrooms and laboratories. Laboratories are furnished with equipment typical of that used in industry and research, such as personal computers that are networked to the University's computer facilities, tractors, engines, surveying equipment, etc. Department faculty have received recognition for outstanding teaching and research on the state and national levels. Faculty expertise varies across a wide and diverse range of specialties related to agricultural and biological systems.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ASM 115		3 ASM 496 (Field Exp./Ag Tech Expo)	1
ASM 125		3 COMM 110	3
ENGL 110		3 CSCI 114 or TL 116	3
PAG 115		2 ENGL 120	3
Elective (Option)		3 MATH 105	3
		HUM/FINE ARTS & CULTURAL DIVERSITY	3
		14	16
Sophomore			
Fall	Credits	Spring	Credits
ASM 225		3 ASM 264	3
ACCT 102		3 ASM 264L	1
ECON 201		3 ECON 202	3
PHYS 211		3 Elective (Option)	6

PHYS 211L or CHEM 121L	1	Elective (Free)	4
	13		17
Junior			
Fall	Credits	Spring	Credits
ASM 323		3 ASM 373	3
CHEM 121		3 ASM 374	1
STAT 330		3 CHEM 122	3
WELLNESS		2 ENGL 320, 321, 324, or 459	3
Elective (Option)		3 Elective (Option)	3
		Elective (Free)	3
	14		16
Senior			
Fall	Credits	Spring	Credits
ASM 354		3 ASM 429	3
ASM 378		3 ASM 475	2
HUM/FINE ARTS		3 Elective (Option)	10
Elective (Option)		6	
	15		15

Total Credits: 120

Agricultural Systems Management

Department Information

- **Department Location:**
Agricultural and Biosystems Engineering
- **Department Phone:**
701-231-7261
- **Department Email:**
nds.u.asm@nds.u.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/agricultural-systems-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/agricultural-systems-management/#planofstudytext>)

Major Requirements

Major: Agricultural Systems Management

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

ASM Major Requirements

Students must maintain a 2.25 GPA in ASM prefix courses.

Code	Title	Credits
Agricultural Systems Management Core Requirements		
ASM 115	Fundamentals of Agricultural Systems Management (Students transferring in or changing major to ASM with 32+ credits do not need to take ASM 115)	3
ASM 125	Fabrication & Construction Technology (Students transferring in or changing major to ASM with 32+ credits do not need to take ASM 125)	3
ASM 225	Computer Applications in Agricultural Systems Management	3
ASM 264	Natural Resource Management Systems	3
ASM 264L	Natural Resource Management Systems Laboratory	1
ASM 323	Post-Harvest Technology	3
ASM 354	Electricity and Electronic Applications	3
ASM 373	Tractors & Power Units	3
ASM 374	Power Units Laboratory	1
ASM 378	Machinery Principles and Management	3
ASM 429	Hydraulic Power Principles and Applications	3
ASM 475	Management of Agricultural Systems (Capstone Course)	2
ASM 496	Field Experience (Expo)	1
Supporting Courses		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3

ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
MATH 105	Trigonometry (or higher)	3
PAG 115	Introduction to Precision Agriculture	2
PHYS 211	College Physics I (May satisfy general education category S)	3
PHYS 211L or CHEM 121L	College Physics I Laboratory (Either course may satisfy general education category S) General Chemistry I Laboratory	1
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following:		3 or 6
ACCT 102	Fundamentals of Accounting	
ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	

Specialized Options - Select from one of the specialized options listed below. A minor program of study may be completed in place of an option. **30-38**

Total Credits **92-103**

¹ AGRI189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

specialized options

Code	Title	Credits
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Applied Business Option: Minimum 30 Credits

This is the standard option for this major; students can declare another option or the minor option with the Office of Registration and Records.

Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives.

Select courses in agriculture science or supporting areas to enhance careers in Agribusiness. Select courses in consultation with an advisor.

Courses not on the list will require a substitution form to be submitted to the Office of Registration and Records.

Code	Title	Credits
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Production Agriculture Option: Minimum of 30 Credits

Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives

Select courses in consultation with an advisor. Courses not on the list will require substitution form to be submitted to the Office of Registration and Records.

Code	Title	Credits
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Dealership Management Option: Minimum 32-38

Minor in either Business Administration (24 credits) or Agribusiness (18 credits) required. **18-24**

ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	6
ASM 496	Field Experience	2
Elective	Complete any course from the College of Ag, including Ag Econ as well as the BIO dept, and those listed under Program/Option Electives	3
Select one of the following:		3
COMM 214	Persuasive Speaking	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	

Total Credits **32-38**

Degree Requirements and Notes:

- Students must register for an ASM internship in the semester it is to be completed. This includes internships arranged with the NDSU Career Center.
- Transfer grades must be 'C' or higher to count towards major requirements.
- The completion of a minor program of study is suggested but not required. Viable minor options include: Accounting, Agribusiness, Animal Sciences, Business Administration, Construction Management, Crop & Weed Sciences, Industrial Engineering & Management, Public Relations & Advertising, or Range Science.

Minor Requirements

Minor: Agricultural Systems Management

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
ASM 264	Natural Resource Management Systems	3
ASM 354	Electricity and Electronic Applications	3
ASM 373	Tractors & Power Units	3
or ASM 378	Machinery Principles and Management	
Remaining Credits: Select 7 credits from the following:		7
ASM 225	Computer Applications in Agricultural Systems Management	
ASM 323	Post-Harvest Technology	
ASM 374	Power Units Laboratory	
ASM 429	Hydraulic Power Principles and Applications	
ASM 454	Principles and Application of Precision Agriculture	
ASM 475	Management of Agricultural Systems (Capstone)	
ASM 491	Seminar	
ASM 496	Field Experience (Expo)	
ASM 496	Field Experience	
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Code	Title	Credits
Option Electives		
May select any courses offered in the College of Ag, including Ag Econ, as well as the Biology department, and those courses listed here.		
ASM 496 – Ag Tech Expo (1 add'l cr.) may be used as an Option Elective for all Specialized Options. ASM 496 – Field Exp/Internship, 1cr., may also be used as an Option Elective (maximum two credits) in the Applied Business and Production Agriculture Specialized Options only.		
ACCT 201	Elements of Accounting II	
AGEC 1XX - 4XX		
ANSC 1XX - 4XX		
BUSN 340	International Business	
BUSN 487	Managerial Economics	
BUSN 3XX -4XX		
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
COMM 216	Intercultural Communication	
COMM 260	Introduction to Web Design	
COMM 308	Business and Professional Speaking	
COMM 313	Editorial Processes	
COMM 362	Principles of Design For Media	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
ECON 105	Elements of Economics	
ECON 341	Intermediate Microeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 3XX - 4XX		

ENT 1XX - 4XX	
FIN 320	Principles of Finance
FIN 3XX - 4XX	
GEOG 105	Fundamentals of Geographic Information Systems
GEOG 455	Introduction to Geographic Information Systems
GEOG 456	Advanced Geographic Information Systems
GEOG 470	Remote Sensing
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling
IME 335	Welding Technology
MGMT 320	Foundations of Management
MGMT 3XX - 4XX	
MRKT 320	Foundations of Marketing
MRKT 3XX - 4XX	
ME 311	Introduction To Aviation
ME 312	Introduction to Flight
ME 313	Commercial Instrument Ground School
PLSC 1XX - 4XX	
SOIL 1XX - 4XX	

Animal Science

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/animal-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/animal-science/#planofstudytext>)

Major Requirements

Major: Animal Science

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Required Core Courses for Animal Science		
ANSC 114	Introduction to Animal Sciences	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
MATH 103	College Algebra	3
or MATH 105	Trigonometry	
or MATH 107	Precalculus	
or MATH 146	Applied Calculus I	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Select one of the following:		1
ANSC 101	Student Success Techniques - Animal and Equine Science	
ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	
ANSC 201	Student Success Techniques - Nontraditional & Transfer Students	
VETS 150	Introduction to the Veterinary Profession	
ANSC 240	Meat Animal Evaluation and Marketing	3
ANSC 300	Domestic Animal Behavior and Management	3
ANSC 323	Fundamentals of Nutrition	3
ANSC 324	Applied Animal Nutrition	3
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	4
ANSC 478	Research and Issues in Animal Agriculture	3
Select one of the following:		2
ANSC 379	Study Tour Abroad	
ANSC 393	Undergraduate Research (research experience)	
ANSC 396	Field Experience (internship experience)	
Select one of the following:		3
ANSC 480	Equine Industry and Production Systems	
ANSC 482	Sheep Industry and Production Systems	

ANSC 484	Swine Production/Pork Industry Systems
ANSC 485	Poultry Industry and Production Systems
ANSC 486	Beef Industry and Production Systems
ANSC 488	Dairy Industry and Production Systems

Options: Select one of the five options listed below. **44-48**

Students must select one option of interest. The standard option for this major is the Animal Production, Management and Husbandry. Students who wish to declare an option other than the standard option must officially declare that option with the Office of Registration and Records.

Total Credits **84-88**

Option 1: Animal Production, Management, & Husbandry Option

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
BIOC 260	Elements of Biochemistry	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
Select one from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Select one the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
ANSC 340	Principles of Meat Science	3
ANSC 357	Animal Genetics	3
ANSC 370	Fundamentals/Animal Disease	3
ANSC 380	Livestock Sales and Marketing	2
ANSC 480	Equine Industry and Production Systems	3
or ANSC 482	Sheep Industry and Production Systems	
or ANSC 484	Swine Production/Pork Industry Systems	
or ANSC 485	Poultry Industry and Production Systems	
or ANSC 486	Beef Industry and Production Systems	
or ANSC 488	Dairy Industry and Production Systems	
Animal Production, Management, and Husbandry Elective (choose from any level PLSC, NRM, RNG, or SOIL)		6
Total Credits		46

Option 2: Animal Agribusiness Option

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
Select one from the following:		4

BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Select one of the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2
ECON 202	Principles of Macroeconomics (May satisfy general education category B)	3
PLSC 315	Genetics (May satisfy general education category S)	3
AGEC elective	300-400 level	6
Animal Agribusiness Electives (choose from 300+ level ANSC, AGECE, ECON, PLSC or RNG)		9
Total Credits		48

Option 3: Biomedical Science Option

Students interested in veterinary school should consider this option. The option meets most veterinary school prerequisites. Consultation with an adviser is recommended.

Code	Title	Credits
ANSC 357	Animal Genetics	3
or ANSC 314	Animal Biotechnology	
ANSC 444	Livestock Muscle Physiology	3
BIOC 260	Elements of Biochemistry	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 240 or CHEM 341	Survey of Organic Chemistry Organic Chemistry I	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 315	Genetics (May satisfy general education category S)	3
Select one from the following:		4
PHYS 120 & 120L	Fundamentals of Physics and Fundamentals of Physics Laboratory (May satisfy general education category S)	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	
Biomedical Science Elective (choose from 300+ level ANSC, BIOC, BIOL, CHEM, MICR, PHYS OR ZOO)		3
Total Credits		44

Option 4: Livestock Media Option

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2
PLSC 315	Genetics (May satisfy general education category S)	3
Select one of the following evaluation courses:		2
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 235	Equine Evaluation	
Select one from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory (May satisfy general education category S)	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Complete any minor offered by the Department of Communications		21
Total Credits		45

Option 5: Meat Science Option

Code	Title	Credits
AGEC 244	Agricultural Marketing	3
ANSC 230	Meat Grading and Evaluation	2
ANSC 340	Principles of Meat Science	3
ANSC 344	Fundamentals of Meat Processing	2
ANSC 357	Animal Genetics	3
ANSC 444	Livestock Muscle Physiology	3
BIOC 260	Elements of Biochemistry	4
CFS 210	Introduction to Food Science and Technology	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
CFS elective	300-400 Level	3
Select one from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab (May satisfy general education category S)	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one from the following:		4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	
Meat Science Electives (choose from 300+ level ANSC, BIOC, CFS, CHEM, MICR OR SAFE)		6
Total Credits		46

Degree Requirements and Notes:

- Students must earn a minimum 2.00 cumulative GPA for courses that satisfy major requirements.
- Transfer grades must be 'C' or higher to count toward major requirements.

Minor Requirements

Minor: Animal Science

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 220	Livestock Production	3
ANSC 240	Meat Animal Evaluation and Marketing	3
Elective Courses *		5
Must include one of the following courses:		
ANSC 300	Domestic Animal Behavior and Management	
ANSC 314	Animal Biotechnology	
ANSC 323	Fundamentals of Nutrition	
ANSC 324	Applied Animal Nutrition	
ANSC 340	Principles of Meat Science	
ANSC 357	Animal Genetics	
ANSC 370	Fundamentals/Animal Disease	
ANSC 444	Livestock Muscle Physiology	
ANSC 463	Physiology of Reproduction	
ANSC 487	Growing and Finishing Cattle Management	
Remaining credits may come from those listed above or the following courses:		
ANSC 230	Meat Grading and Evaluation	
ANSC 231	Livestock Evaluation	
ANSC 232	Dairy Cattle Evaluation	
ANSC 344	Fundamentals of Meat Processing	
ANSC 380	Livestock Sales and Marketing	
ANSC 426	Feed Technology	
Total Credits		16

* Enrolling in two 2-credit courses will not fulfill elective requirements.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Animal Science

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**

B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/animal-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/animal-science/>)

The animal science major at North Dakota State University encompasses physiology, nutrition, genetics, reproduction, marketing, management and husbandry of livestock and companion animals; the important scientific understanding for the utilization of animal products; and experiences necessary for leadership in, and advocacy for, industries providing animals and animal products that benefit humans.

The faculty and staff conduct teaching, research and extension programs to support production and utilization of many types of animals, including beef and dairy cattle, sheep, swine, horses and poultry, as well as those providing other types of food and fiber, companion animals and animals in zoos.

The Curriculum

Five study options are available for the animal science major.

Animal Production, Management and Husbandry – This option is designed for students wanting a background in the principles of animal management and husbandry. It includes broad training in animal husbandry, production and management.

Animal Biomedical Science – This option offers students a more scientific approach to animal science, preparing them for positions in research, teaching or veterinary medicine. Students receive an animal science degree while meeting academic requirements for application to veterinary schools.

Animal Agribusiness – This option is designed for students desiring a background in the business and economic principles of the livestock industry.

Livestock Media – This option offers students an opportunity to acquire skills in journalism, advertising and public relations in addition to the fundamentals of animal science.

Meat Science – This option provides the opportunity to emphasize knowledge about the science of muscle biology and evaluation and processing of red meat.

High School Preparation

High school preparation should include course work in biology, chemistry, English and algebra.

Career Opportunities

Animal science students qualify for many varied occupations that involve animal and agriculture business, livestock products and land management. Graduates find employment in careers fields such as nutrition and pharmaceutical sales and support; areas of Extension; financial lending; the promotion, management and sale of livestock and meat; and farm, ranch and natural resource management. Students may also choose to continue their education in graduate school, veterinary school, or other graduate-level professional programs.

Extra-Curricular Activities

Animal science students belong to a variety of clubs including Saddle and Sirloin, Dairy Club, Rodeo Club, Pre-Vet Club, Horseman's Association, Collegiate Cattlewomen, Range Club, Anthrozoology Club, and Collegiate FFA. The Saddle and Sirloin club is the largest club on campus, and sponsors events such as the Little International Livestock Show, the Hall of Fame Banquet, and Kiddie Days. In addition to clubs, students participate in intercollegiate contests including livestock, meat, and dairy evaluation teams; equestrian and rodeo teams; and academic quadrathlon.

Financial Aid and Scholarships

Part-time work and work-study programs are available at the equine center, in several different livestock units, and in animal science laboratories within the department. Over \$50,000 in departmental scholarships are awarded to Equine Science, Animal Science and Veterinary Technology students annually. In addition, the College of Agriculture, Food Systems, and Natural Resources awards scholarships each year to incoming freshman and current NDSU students. Contact the Office of the Dean, College of Agriculture, Food Systems, and Natural Resources, for more information on college scholarships <https://www.ag.ndsu.edu/academics/scholarships> (<https://www.ag.ndsu.edu/academics/scholarships>)

Student loan, grant and work-study information is available from the Office of Financial Aid and Scholarships, and One Stop <https://www.ndsu.edu/onestop/finaid/>

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

This sample plan of study applies to the Animal Production, Management, and Husbandry study option (Option 1). For other study options, see examples on the departmental website (<https://www.ag.ndsu.edu/ansc/undergraduate-programs-1/undergraduate-programs/>).

Freshman			
Fall	Credits	Spring	Credits
ANSC 101		1 ANSC 240	3
ANSC 114		3 BIOL 111 or 150	3
ENGL 110 (C)		3 BIOL 100L	1
ANSC 218		3 ENGL 120 (C)	3
MATH 103		3 Gen Ed Humanities & Fine Arts and Cultural Diversity (A & D)	3
CHEM 117 or 121 (S)		3 Electives	3
CHEM 117L or 121L (S)		1	
		17	16
Sophomore			
Fall	Credits	Spring	Credits
AGEC 242		3 AGECE 244	3
ANSC 230, 231, 232, or 235		2 BIOC 260	4
COMM 110		3 STAT 330 (R)	3
ECON 201 (B & G)		3 Gen Ed Humanities & Fine Art (A)	3
MICR 202 & 202L (S)		3 Gen Ed Science & Technology (S)	3
		14	16
Junior			
Fall	Credits	Spring	Credits
ANSC 300		3 ANSC 324	3
ANSC 323		3 ANSC 340	3
ANSC 357		3 ANSC 380	2
ANSC 370		3 ANSC 463 & 463L	4
ANSC 379, 393, or 396		2 Gen Ed Upper Division Writing (C)	3
		14	15
Senior			
Fall	Credits	Spring	Credits
ANSC 482 or 488**		3 ANSC 478	3
Gen Ed Social & Behavioral Sciences (B)		3 ANSC 480, 484, 485, or 486**	3
Animal Prod, Mgt, & Husbandry Elective		3 Electives	8
Animal Prod, Mgt, & Husbandry Elective		3	
Gen Ed Wellness (W)		2	
		14	14
Total Credits: 120			

** Two production courses are required. ANSC 482 and 488 are offered during fall semester; ANSC 480, 485, and 486 are offered during spring semester.

Anthropology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Email:**
ndsusocanth@ndsus.edu
- **Department Web Site:**
www.ndsu.edu/soc.anth/ (<http://www.ndsu.edu/soc.anth/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/anthropology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/anthropology/>)

Anthropology is the study of human beings over time and space. It seeks to understand humans by exploring the differences and similarities between humans and the human experience in all parts of the world and throughout humanity's existence.

The Mission

The mission of the anthropology major and minor degrees is twofold: (1) the promotion of cross-cultural and international understanding and (2) the advancement of knowledge about the human condition. Across subdisciplines and geographical areas, we take a cultural approach to understanding human variation past, present and future. Our mission goals are met by way of teaching, research and service to the university, state, region and profession of anthropology.

Faculty

The anthropology program has three faculty members with varying research interests and areas of specialization. The anthropology faculty provide expertise in gender, race, indigeneity, postcolonial studies, the African Diaspora, household and landscape archaeology, medical anthropology, and psychological anthropology across cultures. They employ GIS, ethnohistoric, and ethnographic methods. They cover regional studies in North America, the Caribbean, and East Asia.

The research efforts of the anthropology faculty are constantly integrated with the teaching process to bring new information and approaches to the classroom. This integration makes the classroom experience of majors and graduate students vibrant and dynamic. Faculty research activities also can provide students with valuable pre-professional experience as research assistants.

Laboratories

Students can pursue opportunities to work in the Archaeology Materials Lab as part of their course work, or in some cases, as paid research assistants. Materials from archaeological field studies are processed and analyzed in the lab. Students may also work with GIS data as part of Archaeological research projects.

Field Schools/Internships

The department encourages students to pursue field school opportunities where they can gain hands-on experience in archaeology or cultural anthropology while also earning course credit. Faculty periodically offer archaeological field schools in North America and the Caribbean. In addition, faculty advise students on selecting other field experiences abroad and nationally. In recent years students have completed field experiences in Wisconsin, Jamaica, Ireland, Greece, Mexico, and Poland. Faculty work with students on internship opportunities as pre-professional experience and have placed students in internships with numerous businesses, heritage organizations, and museums.

Career Opportunities

As with other fields of study that form the core of a solid liberal arts education, anthropology prepares students for many life and career challenges. An undergraduate degree in anthropology prepares students to think critically and analytically. It fosters a deep appreciation and understanding of cultural diversity and cross-cultural relations. Common areas of employment include advertising and public relations, community development, contract archaeology, corporate business and industry, cultural resource management, government agencies, non-profit organizations, policy research, and social services. For more information on anthropology employment, refer to the North Dakota State University Anthropology website or visit the American Anthropological Association website at www.aaanet.org.

The Curriculum

The course requirements in anthropology are designed to provide students with a solid grounding in the discipline as a whole and training in research and analysis methods. The curriculum covers the multiple subdisciplines in anthropology. Anthropology faculty advisors work very closely with students on the specific plan of study that best suits their needs and interests.

Anthropology Club

The Anthropology Club is a student directed organization with sponsorship and advising provided by the anthropology faculty. The club provides a forum for learning more about anthropology and related careers, for engaging in community service, and for interacting with students with different interests, levels of experience and education in anthropology.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ANTH 111 (Gen Ed Soc/Beh Sci & Cult Div)		3 ANTH 204	3
SOC 110 (Gen Ed Soc/Beh Sci)		3 ENGL 120 (Gen Ed Comm)	3
ENGL 110 (Gen Ed Comm)		3 Gen Ed Humanities/Fine Arts	3
Gen Ed Science/Technology		4 Gen Ed Wellness	2
		Gen Ed Humanities/Fine Arts & Global Perspect	3
		13	14
Second Year			
Fall	Credits	Spring	Credits
ANTH 204, 205, or 206		3 COMM 110 (Gen Ed Comm)	3
Elective 300-400 Level		3 Elective 300-400 Level	3
Minor or Language		3 Minor or Language	3
AHSS Requirement Area One		3 Gen Ed Science/Technology	3
Gen Ed Science/Technology & Lab		3 Elective	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
Major Elective 300-400		3 Major Elective 300-400 Level	3
Major Elective 300-400		3 Minor or Language	3
Minor or Language		3 Gen Ed Upper Level Comm Writing	3
AHSS Requirements Area Two		3 Gen Ed Quantitative Reasoning	3
Elective		3 Electives	4
		15	16
Fourth Year			
Fall	Credits	Spring	Credits
ANTH 471 or 481		3 ANTH 470 or 480	3
ANTH 489		1 Major Elective 300-400 Level	3
Minor or Language		3 Minor or Language	3
AHSS Requirement Area Three		3 Additional course @ 300-400 level	3
Major Elective 300-400 level		3 Electives	4

Major Elective 300-400 level	3	
	16	16

Total Credits: 120

Anthropology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/anthropology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/anthropology/#planofstudytext>)

Major Requirements

Major: Anthropology

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

- * May be satisfied by completing courses in another General Education category.
- † General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.
- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Anthropology Core Requirements		
SOC 110	Introduction to Sociology (May satisfy general education category B) ¹	3
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D) ¹	3
ANTH 204	Archaeology and Prehistory ¹	3
ANTH 205	Human Origins ¹	3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
ANTH 470	Theory in Archaeology ^{1, 2}	3
or ANTH 480	Development of Anthropological Theory	
ANTH 471	Archaeological Research Methods ^{1, 2}	3
or ANTH 481	Ethnographic Research Methods	
ANTH 489	Senior Capstone In Anthropology ¹	1
Major Electives 300-400 Level:		15
Other courses may qualify to substitute for the 300-400 level courses. Substitutions must be approved by the adviser and department chairperson prior to course enrollment. These include internships, field schools, archaeology lab credits, etc.		
Total Credits		37

¹ Students must earn a 'C' or better in each of the Core Requirements courses to successfully complete their major requirements.

² Other courses may qualify to substitute for the Theory and Methods courses. Substitutions must be approved by the adviser and department chairperson prior to course enrollment and paperwork must be filed with the Office of Registration and Records.

Minor Requirements

Minor: Anthropology

Required Credits: 18

Code	Title	Credits
Required Courses		
ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
Electives: Select two of the following:		6
ANTH 204	Archaeology and Prehistory	
ANTH 205	Human Origins	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
Additional Electives		
Two anthropology courses at the 300-400 level		6
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Apparel, Retail Merchandising and Design

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/apparel_retail_merchandising_design/ (http://www.ndsu.edu/adhm/apparel_retail_merchandising_design/)
- **Credential Offered:**
B.S.; B.A.; Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/apparel-retail-merchandising-design/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/apparel-retail-merchandising-design/>)

If you are looking for a career in a fast-paced environment that provides new opportunities each day, then a degree in Apparel, Retail Merchandising and Design (ARMD) is just for you. The global textile and apparel industry is made up of companies that produce fibers, yarns, and textile and apparel products for consumers around the world. National and global retailers provide goods and services to consumers everywhere, via multi-channel retailing involving traditional stores, catalogs, online venues, including social networking sites.

The undergraduate program in ARMD offers students opportunities to develop new approaches for dealing with challenges facing all areas of the global textile, apparel, and retail industry. Students are involved in designing new solutions for an ever-evolving global industry. Because of the size and scope of the industry, there are a variety of career opportunities available worldwide.

Students gain aesthetic, technical, practical, and professional skills in three option areas - *fashion product development*, *fashion entrepreneurship*, and *retail merchandising*. Retail merchandising and fashion entrepreneurship options provide students with a firm grasp of business strategy. The fashion product development option focuses on developing, designing, and marketing materials and products within this global industry. Students develop a trained eye and skills to showcase and sell products to a fashion-conscious consumer.

POSSIBLE CAREER PATHS:

- Apparel buyers
- Product developers
- Visual merchandisers
- Technical designers
- E-commerce developers
- Fashion entrepreneurs
- Social media specialists

- Retail managers
- Fashion forecasters
- Interior merchandisers

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Fashion Product Development Option

Freshman					
Fall	Credits	Spring	Credits		
ADHM 101		3 ADHM 155	3		
ADHM 171		3 ADHM 181	3		
CSCI 114 or TL 116		3 COMM 110	3		
ENGL 110		3 ENGL 120	3		
Wellness		2 ECON 105	3		
		14	15		
Sophomore					
Fall	Credits	Spring	Credits		
ADHM 310		3 ADHM 280	3		
ADHM 366		3 ADHM 386	3		
ADHM 367		1 ADHM 371	3		
STAT 330 or CSCI 159*		3 ADHM 410	3		
PSYC 111		3 Science/Tech Lab	4		
Science/Tech		3			
		16	16		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 375		1 ADHM 271	3	ADHM 496	4
ADHM 385		3 ADHM 272	3		
ADHM 455		3 Elective	3		
ADHM 489**		1 Elective	3		
ENGL 321		3 Elective	3		
Elective		4			
		15	15		4
Senior					
Fall	Credits	Spring	Credits		
Elective		3 Elective	3		
Elective		3 Elective	3		
Elective		3 Elective	3		
Elective		3 Elective	4		
		12	13		
Total Credits: 120					

* Prerequisites may apply

** Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Spring or Summer

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Fashion ENTREPRENEURSHIP or Retail Merchandising Option

Freshman					
Fall	Credits	Spring	Credits		
ADHM 171		3 ACCT 102	3		
ENGL 110		3 ADHM 181	3		
CSCI 114 or TL 116		3 COMM 110	3		
ADHM 310		3 ENGL 120	3		
Wellness		2 ECON 105	3		
		14	15		
Sophomore					
Fall	Credits	Spring	Credits		
ADHM 366		3 ADHM 280	3		
ADHM 367		1 ADHM 371	3		
ENTR 201 or COMM 260		3 ADHM 386	3		
PSYC 111		3 ENTR 301 or COMM 261	3		
STAT 330 or CSCI 159*		3 Science/Tech Lab	4		
Science/Tech		3			
		16	16		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 375		1 ADHM 271	3	ADHM 496	4
ADHM 385		3 ADHM 410	3		
ADHM 489**		1 MRKT 362	3		
MGMT 320 (Elective)		3 MRKT 410	3		
MRKT 320		3 ENGL 321	3		
ENTR 401 (or Elective)		3			
		14	15		4
Senior					
Fall	Credits	Spring	Credits		
ADHM 372		3 ADHM 425	3		
ADHM 470		3 ADHM 272	3		
MRKT 465 (or Business Elective)		3 Elective	3		
Elective		4 Elective	4		
		13	13		

Total Credits: 120

* Prerequisite may apply

** Minimum 1 credit Study Tour in consultation with your advisor. Three-credit Study Tour is typically offered in Spring or Summer.

Apparel, Retail Merchandising and Design

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/apparel_retail_merchandising_design/ (http://www.ndsu.edu/adhm/apparel_retail_merchandising_design/)
- **Credential Offered:**
B.S.; B.A.; Certificate
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/apparel-retail-mechandising-design/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/apparel-retail-mechandising-design/>)

Major Requirements

Major: Apparel, Retail Merchandising & Design

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Apparel, Retail Merchandising and Design Core Requirements		
ADHM 171	Fashion Dynamics	3
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	3
ADHM 271	Visual Merchandising and Promotion	3
ADHM 272	Product Development	3
ADHM 280	Technology Applications for the Apparel Industry	3
ADHM 310	History of Fashion (May satisfy general education category A)	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 371	Fashion Trend Analysis and Forecasting	3
ADHM 375	Professional Development	1
ADHM 385	Global Fashion Economics	3
ADHM 386	Merchandise Planning and Buying	3
ADHM 410	Dress in World Cultures (May satisfy general education category A and D)	3
ADHM 489	Study Tour	1
ADHM 496	Field Experience	4
or ENTR 496	Practicum/Internship	
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
ECON 105	Elements of Economics (May satisfy general education category B and G)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
or CSCI 159	Computer Science Problem Solving	
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
OPTION SELECTION: Select one option from the three listed below.		9-36
Total Credits		64-91
Code	Title	Credits
Retail Merchandising Option		
ADHM 372	Global Retailing	3
ADHM 425	Experiential Retailing	3
ADHM 470	Retail Financial Management and Control	3
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
Business minor is required		
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MRKT 362	Foundations of Retailing	3
MRKT 410	Consumer Behavior	3
Select one from the following:		3
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 440	International Marketing	
MRKT 460	Marketing Strategy	
MRKT 465	Digital Marketing	
ADHM 372/MRKT 372 may be used as an elective for the business minor.		
Total Credits		33

Code	Title	Credits
Fashion Product Development Option		
ADHM 101	Beginning Apparel Construction	3
ADHM 155	Apparel Construction and Fit	3
ADHM 455	Apparel Design and Assembly	3
Total Credits		9

Code	Title	Credits
Fashion Entrepreneurship Option		
ADHM 372	Global Retailing	3
ADHM 425	Experiential Retailing	3
ADHM 470	Retail Financial Management and Control	3
Entrepreneurship minor is required		
ENTR 201	Introduction to Entrepreneurship	3
or MGMT 470	Entrepreneurship/Small Business Management	
ENTR 301	Entrepreneurship Toolbox I	3
ENTR 401	Entrepreneurship Capstone	3
Business minor is required		
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MRKT 362	Foundations of Retailing	3
MRKT 410	Consumer Behavior	3
MRKT 465	Digital Marketing	3
ADHM 372/MRKT 372 may be used as an elective for the business minor		
Total Credits		36

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.
- Business minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor.

Minor Requirements

Minor: Apparel, Retail Merchandising and Design

Required Credits: 16

Code	Title	Credits
Required Courses		
ADHM 171	Fashion Dynamics	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
Electives: 9 credits from the following:		9
ADHM 101	Beginning Apparel Construction	
ADHM 155	Apparel Construction and Fit	
ADHM 171	Fashion Dynamics	
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	
ADHM 271	Visual Merchandising and Promotion *	
ADHM 272	Product Development	
ADHM 280	Technology Applications for the Apparel Industry	
ADHM 310	History of Fashion	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	

ADHM 385	Global Fashion Economics	
ADHM 386	Merchandise Planning and Buying	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 455	Apparel Design and Assembly	
ADHM 470	Retail Financial Management and Control	
ADHM 489	Study Tour	
MRKT 320	Foundations of Marketing	
MRKT 362	Foundations of Retailing	
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.

Certificate Requirements

Certificate: Apparel, Retail Merchandising & Design

Required Credits: 10

Code	Title	Credits
ADHM 101	Beginning Apparel Construction	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
Elective Courses: Select one from the following:		3
ADHM 371	Fashion Trend Analysis and Forecasting	
ADHM 372	Global Retailing	
ADHM 385	Global Fashion Economics	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 489	Study Tour	
Total Credits		10

Architecture

Department Information

- **Department Location:**
Klai Hall
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsua@ndsua.edu
- **Department Web Site:**
www.ndsu.edu/ala/ (<http://www.ndsu.edu/ala/>)
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/architecture/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/architecture/#planofstudytext>)

Major Requirements

Major: Architecture

Degree Type: B.S.Arch**Minimum Degree Credits to Graduate: 138**

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Code	Title	Credits
Architecture Requirements		
ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
ARCH 231	Creativity and Communication	3
ARCH 232	Design Technology	3
ARCH 233	Math for Designers	1
ARCH 271	Architectural Design I	6
ARCH 272	Architectural Design II	6
ARCH 321	History and Theory of Architecture I (May satisfy general education category A and G)	3
ARCH 322	History and Theory of Architecture II	3
ARCH 323	History and Theory of Architecture III	3
ARCH 341	Site Design for Architects	3
ARCH 344	Architectural Structures I	3
ARCH 351	Materials & Construction	3
ARCH 371	Architectural Design III	6
ARCH 372	Architectural Design IV	6
ARCH 443	Architectural Structures II	3
ARCH 450	Architectural Detailing	3

ARCH 453	Environmental Control Systems: Passive Principles	3
ARCH 454	Environmental Control System: Active System	3
ARCH 461	Urban Design	3
ARCH 471	Architectural Design V (Capstone)	6
ARCH 472	Architectural Design VI	6
or ARCH 474	International Design Studio	
Select one Upper Division Writing English from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENVD 101	Introduction to Environmental Design (May satisfy a general education category A)	3
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
PHYS 120	Fundamentals of Physics (May satisfy general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Elective Requirements		
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
PHIL Elective		3
Total Credits		105

Degree Requirements and Notes

- A grade of C or higher is required in all courses with an ARCH and ENVD prefix.
- If a student receives a grade of "D" or "F" in studio, he/she will be required to repeat the studio class the following year, before advancing to the next studio course.

Architecture

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsu.ala@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/ala/ (<http://www.ndsu.edu/ala/>)
- **Credential Offered:**
B.S.Arch.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/architecture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/architecture/>)

Architecture is a fine art devoted to the design of the human environment. The architect is concerned with the aesthetic, social, environmental, technological and psychological factors that influence the design of a building. Architects are involved in the success, quality and appearance of a building within the context of a community and the city. Architecture is a dynamic profession that ranges from residential houses to large-scale urban buildings. An architect can design houses, commercial buildings, museums, college science buildings, and resorts, as well as many other building types.

BACKGROUND INFORMATION

To become an architect, you must learn to make use of science and technology, and develop sensitivity for beauty in the design of space and form with material. You must develop a deep understanding of people and their surroundings. Because this work encompasses so many different fields of interest, the architect is best thought of as a professional who bridges different areas of study and blends them into a single, significant activity.

CAREER OPPORTUNITIES

Architects work in architectural firms or accept positions with government, corporations or institutions. Some architects become highly specialized; others remain generalists in the profession, working on all facets of a project. Whichever path your career may follow, it is necessary to first build a firm background that includes essential architectural knowledge and skills. Architecture provides a variety of interesting positions within the discipline. One can either work for an established architecture firm or create their own business. There are three typical areas in architecture which one can focus on (or one can do all three) once they begin working. These three areas are: the design or aesthetic aspects of a project, the technical or material aspects of a project, or as the construction liaison when a project is being built. Further, architecture is a scalable profession depending on one's interests. For example, the possible areas one can work in range from small-scale residential houses to large-scale skyscrapers.

ACCREDITATION

The five-year Master of Architecture degree is fully accredited by the National Architectural Accreditation Board (NAAB). For more information see, www.naab.org/home. To become a licensed architect requires an accredited professional degree, completion of the Architectural Experience Program (AXP) and passing your state's licensing examination.

THE PROGRAM

The architecture program is a five-year professional course of study leading to a Master of Architecture degree. This degree is nationally accredited and recognized by all state architectural licensing boards. Students receive a Bachelor of Science in Architecture, a pre-professional degree, at the end of four years. During the first year of pre-architectural studies, the curriculum addresses the understanding of the environment and our impact on nature. In addition to meeting general education and departmental requirements students take five environmental design courses (ENVD) comprised of lecture courses, a drawing course and a design fundamentals course. Beginning at the sophomore level, there is a selective admissions process where admitted students become architecture majors. We limit our studio courses to a maximum of 16 students to maintain a high level of student faculty contact. The program is a studio based model of education where students have high contact hours with their professors and learn problem solving techniques and design methodologies. The primary focus is on design thinking where students engage in individual and group projects that represent a vast array of design problems that require real-world solutions. Our primary focus is for students to learn to be great designers and leaders who engage the dynamic and emerging problems of the world with beautiful and thoughtful designs. Students will learn how to communicate their ideas through writing and public speaking in addition to traditional and new ways of thinking and communicating such as physical models, drawings, computer animation and renderings and virtual reality. The program has required field trips, a lecture series and invited outside professionals that help students focus on their own interests in architecture and create a project based on those interests.

ACTIVITIES AND FACILITIES

Activities within the department include:

- Student chapters of the American Institute of Architecture Students; Tau Sigma Delta; Freedom by Design; U.S. Green Building Council; National Organization of Minority Architects
- Yearly career fair
- Student-run Beaux Arts Ball with a guest speaker
- Interaction with community projects such as eFargo
- Studio field trips to U.S. cities
- Visiting lecturers who speak on architecture and related topics
- Joint studio projects with the landscape architecture program
- Semester-long term abroad
- Summer study opportunities in Europe and North America and an International Student Exchange Program
- Summer internship opportunities

Our facilities include:

- Two remarkable buildings located in downtown Fargo: Klai Hall and Renaissance Hall
- 3-D prototyping and printing
- 3-D computing rendering and server farm
- State-of-the-art computing labs
- Computer aided laser cutters and CNC
- Large document printers and scanners
- Software such as GIS, CAD and 3-D rendering and modeling
- An Architecture and Landscape Architecture Library of about 18,000 books, 70 magazine subscriptions and 36,000 slides
- Photographic and graphic reproduction equipment
- Individual studio spaces in the second through fifth years

HIGH SCHOOL PREPARATION

We suggest that students take high school courses in digital drawing and animation, an art class, such as drawing from life, and math and science courses such as calculus, trigonometry and physics. If possible, we encourage high school students to take advance placement or college credit courses that could be substitutes for North Dakota State University General Education requirements.

TRANSFER STUDENTS

Transfer applicants are required to enter the architecture program at the first-year level. Five years of study are required for completion of the degree. Advanced standing is possible through a portfolio and transcript review process.

SELECTIVE ADMISSION

Approximately 64 architecture majors are selected for admission into the second year of the program. A student's eligibility is based on their overall grade point average (GPA) and their GPA for pre-architecture courses with the ENVD prefix. It is important to apply early, complete all freshman courses in the first year and maintain a solid academic record. Students must have a minimum 3.0 GPA to apply to the graduate school during the third or fourth year of the program.

SPECIAL NOTICE

Students in the second year of the program will be required to purchase a laptop computer. Information on type of computer, software, purchase, and financing arrangements will be distributed to students prior to purchase.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENVD 101		3 ENVD 104	1
ENVD 102		1 ENVD 172	3
ENVD 130		3 ENGL 120	3
ENGL 110		3 COMM 110	3
ARCH 321		3 ARCH 322	3
PHYS 120		3 Gen Ed Quantitative Reasoning Requirement	3
		Gen Ed Wellness Requirement	2
		16	18
Second Year			
Fall	Credits	Spring	Credits
ARCH 271		6 ARCH 272	6
ARCH 231		3 ARCH 232	3
ARCH 233		1 ARCH 344	3
ARCH 323		3 PSYC 111	3
Gen Ed Science & Tech Requirement		3 PHIL Elective	3
		16	18
Third Year			
Fall	Credits	Spring	Credits
ARCH 371		6 ARCH 372	6
ARCH 341		3 ARCH 450	3
ARCH 351		3 ARCH 454	3
ARCH 453		3 ARCH 461	3

Gen Ed Science & Tech Lab Requirement		1 ENGL 326 or 357	3
		16	18
Fourth Year			
Fall	Credits	Spring	Credits
ARCH 471		6 ARCH 472 or 474	6
ARCH 443		3 SOC 110	3
ANTH 111		3 Electives	3
Gen Ed Science & Tech Requirement		3 Electives	5
Electives		3	
		18	17
Total Credits: 137			

Art

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-8818
- **Department Web Site:**
www.ndsu.edu/visualarts/ (<http://www.ndsu.edu/visualarts/>)
- **Credential Offered:**
B.S.; B.A.; B.F.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/art/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/art/>)

The visual arts Department at North Dakota State University is part of the School of Design, Architecture and Art. The Department offers a broad range of degree programs from art emphasis areas in graphic design, painting, printmaking, ceramics, drawing, sculpture, photography and art education. It provides a wide range of courses with the philosophy that a strong foundation in the development of creative strategy, digital literacy, design ability, critical thinking and art/design historical awareness will prepare our students for the art and design world today.

THE PROGRAM

With a vibrant major and minor program, the Visual Arts Department brings together students from every college in the University. As a primary career specialization, or as a complement to another major field, art and design is one of the most versatile areas of study. Housing in one of the finest facilities in the upper Midwest for art and design, the department is home to ten professional artists/designers/scholars who teach every class we offer. We are an undergraduate program only, and are focused on the individual attention, modest class sizes and high quality advising for our undergraduate students.

THE FACILITIES

Renaissance Hall, state-of-the-art facility located in downtown Fargo houses the Department of Visual Arts. The building provides well-equipped studio facilities for graphic design, drawing, painting, printmaking, photography, sculpture and expanded media and ceramics. Our new digital media lab has been equipped with the most current output devices and the program has access to A second digital media studio, LAAVA Lab, provides a design thinking gathering space with high tech tools including CNC, 3D printing, 3D ceramic printing, laser cutting and virtual reality facilities. The print shop houses several etching and litho presses as well as facilities for letterpress and silkscreen printing. The ceramic student is well equipped with three gas kilns and a wood burning kiln, clay mixing facilities and 25 throwing wheels. The large sculpture studio houses various types of welders, a plasma cutter and other tools for metal work, woodworking and carving in stone. A high-tech classroom for art history seats 75 and is also available for smaller classes. The department has its own gallery in the Renaissance Hall and has a partnership with the Memorial Union Gallery on main campus. A wide range of exhibitions, including national traveling exhibitions, and student and faculty shows are always available on and off campus. In close proximity to the Plains Art Museum, the department and the Plains work closely together, enhancing art experiences for the entire region.

THE TEACHING COMMUNITY

The teaching community is composed of Department Chair and Director of the School, Michael Strand, Kimble Bromley, David Swenson, Meghan Duda, Andrew Stark, Eric Syvertson, Jeff Knight as well as Affiliated faculty members who work directly with out students, Dr. Elizabeth Crisp Crawford (Advertising), Anthony Faris (Gallery Director and Capstone Instructor), Amanda Heidt (Artist Researcher), Aaron Yang, (Ph.D candidate and UX/UI

instructor). Our faculty are involved in the practices at local, regional and International levels with the approach that being engaged at a high level in production makes for better instruction. Supporting this community is a professional staff including Administrative Assistant, Kelly Todd and Design Technologist, Ben Bernard. The art faculty prides itself in being very accessible to students at all times for individual consultation and critique.

PEARS PROGRAM

The Printmaking Education and Research Studio (PEARS) is the research arm of the Department. PEARS has transformed into a community research and printmaking advocacy studio. This program looks for ways to intersect the printmaking process across disciplines within the school and campus. Additionally PEARS serves the Land Grant mission of engagement with communities in a variety of ways through workshops and unique programming. The program also offers artist residencies, internships and studio rentals to qualified artists and promotes sales and exhibition of artwork produced in the studio.

CAREER OPPORTUNITIES

Art and Design students develop a range of skills from creative strategy to technical proficiency. These skills are broadly applicable to careers in many different disciplines. Potential careers include marketing, advertising, illustration, graphic design, user experience specialist, animation, arts marketing, art historian, commercial photography, museum and gallery work, exhibition design, art therapy, professional studio artist, municipal art programs, art criticism, independent art instruction, industrial design, art media research, arts organizations, university instruction and K-12 education.

THE CURRICULUM

With an early emphasis on technology and skills relevant in the 21st century, all students graduating from Visual Arts have a background in design. From this foundation, students select tracks including: K-12 education, graphic design/illustration, printmaking, painting, photography, ceramics, sculpture and drawing. The program offers a highly flexible and personal approach to each student's development. The middle of the program focuses on developing a portfolio strong enough to apply for the capstone experience which is either a three-credit or six-credit baccalaureate project and thesis exhibition during the senior year. The Tri-College University, which includes Concordia College, Minnesota State Community and Technical College, Minnesota State University Moorhead and North Dakota State College of Science offers students access to specialized courses not offered in the NDSU art curriculum.

THE DEGREES

Students majoring in art have several degree options. The Bachelor of Fine Arts (BFA) is the professional degree requiring 75 hours in art with an emphasis in one or a combination of the following: graphic design, painting, ceramics, printmaking, sculpture, photography or drawing.

The Bachelor of Arts (BA) and the Bachelor of Science (BS) requires 57 hours in art with an emphasis in one of the following: graphic design, painting, ceramics, printmaking, sculpture, photography or drawing.

The BA also requires a competency in a foreign language through the intermediate level and the BS degree requires a minor in another discipline.

Art Education is offered as a BS degree in collaboration with the NDSU School of Education. A minimum of 120 credit hours are needed for graduation.

SCHOLARSHIPS

The multi-million dollar James Falck Endowment for Visual Arts is part of a new suite of scholarships for incoming freshman and existing visual arts majors. Scholarships are awarded based on academic excellence and portfolio review. For more information contact the NDSU Department of Visual Arts at (701) 231-8818 or email Kelly.Todd@ndsu.edu.

ART MINOR

The art minor has been recently updated to be completely flexible and serve as a unique "compliment" to any existing major. By being flexible, you can choose a path that suits your educational goals. For instance, a graphic design emphasis in your minor program would be an ideal compliment to many fields, including marketing, advertising, business, architecture and engineering.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ART 122		3 ART 131	3
ART 124		3 ART 211 (A)	3
ART 210 (A)		3 ENGL 120 (C)	3
ENGL 110 (C)		3 Gen Ed Quantitative Reasoning	3

Gen Ed Social & Behavioral Sci and Global Perspectives		3 ART 185	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
ART 230		3 Gen Ed Science & Tech/Lab	4
ART 100 Level - Intro Studio		3 ART 100 Level - Intro Studio	3
ART 100 Level - Intro Studio		3 AHSS College Requirements	3
COMM 110 (C)		3 Minor Coursework	3
Gen Ed Science & Technology (S)		3 ART 300 Level - Topic Studio	3
		15	16
Third Year			
Fall	Credits	Spring	Credits
ART 100 Level - Intro Studio		3 ART 100 Level - Intro Studio	3
ART 452		3 ART 335	3
ART 299 (ART 300 Level - Topic Studio)		3 ART 300 Level - Topic Studio	3
Gen Ed Science & Tech		3 Minor Coursework	6
Minor Coursework		3	
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
AHSS College Requirements		3 ART 489	3
Gen Ed Wellness		2 Gen Ed Social and Behavioral Sci & Cultural Diversity	3
ART 391		1-3 Minor Coursework	4
ART 399		1-5 Gen Ed Upper Division Writing	3
Minor Coursework		3 ART 485	3
		13	16
Total Credits: 120			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ART 122		3 ART 131	3
ART 124		3 ART 211 (A)	3
ART 210 (A)		3 ENGL 120 (C)	3
ENGL 110 (C)		3 Gen Ed Quantitative Reasoning (R)	3
Gen Ed Social & Behavioral Sci and Global Perspectives (B & G)		3 ART 185	3
		15	15

Second Year			
Fall	Credits	Spring	Credits
ART 230		3 Gen Ed Science and Tech with Lab (S)	4
ART 100 Level - Intro Studio		3 ART 100 Level - Intro Studio	3
ART 170		3 ART 45X - Art History Rotation	3
Art 45X - Art History Rotation		3 ART 300 Level - Topic Studio	3
Gen Ed Science and Tech (S)		3 COMM 110 (C)	3
		*Foundations Portfolio Review	
		15	16
Third Year			
Fall	Credits	Spring	Credits
ART 100 Level - Intro Studio		3 ART 335	3
ART 45X - Art History Rotation		3 ART 100 Level - Intro Studio	3
Gen Ed Social & Behavioral Sci and Cult Diversity (B & D)		3 ART 300 Level - Topic Studio	3
ART 300 Level - Topic Studio		3 Gen Ed Science & Tech (S)	3
ART 491		1-5 Gen Ed Wellness (W)	2
		*Apply for Baccalaureate	
		15	14
Fourth Year			
Fall	Credits	Spring	Credits
ART 400 Level - Emphasis Studio		3 ART 489	3
Art 489 - Baccalaureate Project		3 ART 400 Level - Emphasis Studio	3
ART 100 Level - Intro Studio		3 ART 400 Level - Studio or Art History Elective	3
Gen Ed Upper Division Writing (C)		3 ART 400 Level - Studio Elective	3
ART 300 Level - Topic Studio		3 Elective	3
*Capstone Exhibition 1		*Capstone Exhibition 2	
		15	15

Total Credits: 120

Art

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-8818
- **Department Web Site:**
www.ndsu.edu/visualarts/ (<http://www.ndsu.edu/visualarts/>)
- **Credential Offered:**
B.S.; B.A.; B.F.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/art/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/art/>)

Major Requirements

Major: Art

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Major Requirements		
Studies in Art History:		
ART 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3
ART 452	Contemporary Art	3
ART 451	History of American Art	3
or ART 453	Topics in Art History	
Studies in Studio:		
ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 230	Drawing II	3
ART 335	Figure Drawing	3
Advanced Studio Electives: Select 6 credits in one area - may be repeated		6
ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 360	Sculpture III	
ART 370	Topics in Printmaking	
ART 380	Topics in Photography	
ART 385	Advanced Topics in Graphic Design	
ART 430	Drawing IV	
ART 330	Drawing III	
ART 435	Advanced Figure Drawing	
ART 494	Individual Study	
Baccalaureate Project & Studio		
Students must complete a 3 credit Baccalaureate Project and a 3 credit Baccalaureate Studio during the same semester.		
Baccalaureate Project		3
ART 489	Baccalaureate Project	
Baccalaureate Studio		3
ART 420	Baccalaureate Studio: Painting	
ART 450	Baccalaureate Studio: Ceramics	

ART 460	Sculpture IV
ART 470	Baccalaureate Studio: Printmaking
ART 480	Baccalaureate Studio: Photography
ART 485	Baccalaureate Studio: Graphic Design

Total Credits**57**

Major Requirements

Major: Art

Degree Type: B.F.A.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

• A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Bachelor of Fine Arts in Art Requirements		
Required Studio Courses		
ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3

ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 230	Drawing II	3
ART 335	Figure Drawing	3
Required Art History Courses		
ART 210	Art History I	3
ART 211	Art History II	3
ART 451	History of American Art	3
ART 452	Contemporary Art	3
ART 453	Topics in Art History	3
Advanced Studio: Select 15 credits from the following with at least two studio areas and with enough depth in one area to develop a Thesis.		15
ART 360	Sculpture III	
ART 350	Topics in Ceramics	
ART 391	Seminar	
ART 320	Topics in Painting	
ART 330	Drawing III	
ART 370	Topics in Printmaking	
ART 379	Study Tour Abroad	
ART 380	Topics in Photography	
ART 385	Advanced Topics in Graphic Design	
ART 399	Special Topics	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 460	Sculpture IV	
ART 491	Seminar	
ART 494	Individual Study (IS may be used in the studio emphasis electives and can be in the following areas: ceramics, graphic design, drawing, painting, photography, printmaking or sculpture.)	
ART 499	Special Topics	
Baccalaureate Capstone		
Students must take 6 credits of Baccalaureate Project and 6 credits of Baccalaureate Studio courses in an emphasis area over the final two semesters.		
Baccalaureate Project		6
ART 489	Baccalaureate Project	
Baccalaureate Studio		6
ART 485	Baccalaureate Studio: Graphic Design	
ART 480	Baccalaureate Studio: Photography	
ART 470	Baccalaureate Studio: Printmaking	
ART 450	Baccalaureate Studio: Ceramics	
ART 420	Baccalaureate Studio: Painting	

Total Credits**75**

Minor Requirements

Minor: Art

Required Credits: 18

Minor Requirements

Code	Title	Credits
Required Courses		
Art History/Art Appreciation Elective		3
Additional Art History/Studio Electives		15
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- This minor is intended to provide maximum flexibility to serve as a compliment to ones major track and/or an opportunity to go deeply into one studio area.

Art Education

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-8818
- **Department Web Site:**
www.ndsu.edu/visualarts/ (<http://www.ndsu.edu/visualarts/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/art-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/art-education/>)

Art Education is offered as a degree through the Visual Arts Department In collaboration with the NDSU School of Education. The program is led by Assistant Professor Eric Syvertson, who prior to NDSU was a 10+ year veteran teacher within the West Fargo School District. The mission of the Art Ed program is developing excellent K-12 artist-educators with a focus on professional practice, community engagement, technology integration and advocacy for the arts and design fields. Teacher candidates are prepared to teach and lead within and outside the school setting. Teacher candidates get the best of both worlds: content and studio courses with faculty in the department of Visual Arts and professional education courses from faculty in the School of Education (SOE). We develop excellent artists with a foundation to become impactful teachers. A minimum of 120 credit hours are needed for graduation.

STUDENT TEACHING

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced art teachers in elementary, middle and high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in Art in most states. Our program is accredited by the National Association of Schools of Art and Design, the Council for the Accreditation of Educator Preparation (CAEP). and approved by the North Dakota Education Standards and Practices Board (ESPB)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ART 122		3 ART 131	3
ART 124		3 ART 211 (A)	3
ART 210 (A)		3 ENGL 120 (C)	3
ENGL 110 (C)		3 Gen Ed Wellness (W)	2

Gen Ed Social and Behavioral Sci & Global Perspectives (B & G)		3	Gen Ed Quantitative Reasoning (R)	3
		ART 100 Level - Intro Studio		3
		15		17
Second Year				
Fall	Credits		Spring	Credits
ART 230		3	EDUC 322	3
EDUC 321		3	Gen Ed Science and Tech with Lab (S)	4
COMM 110 (C)		3	ART 100 Level - Intro Studio	3
ART 100 Level - Intro Studio		3	Gen Ed Social & Behavioral Sci and Cult Diversity (B & D)	3
ART 45X - Art History Rotation		3	Art 300 Level - Studio Topic	3
Complete Core Academic Skills Exam or access your ACT+ scores		*Foundations Portfolio Review		
		*Apply to School of Education		
		15		16
Third Year				
Fall	Credits		Spring	Credits
EDUC 451		3	EDUC 481	3
ART 100 Level - Intro Studio		3	ART 453	3
Art 300 Level - Studio Topic		3	EDUC 489	3
ART 45X - Art History Rotation		3	Gen Ed Science & Tech (S)	3
ART 100 Level - Intro Studio		3	Gen Ed Upper Division Writing (C)	3
		ART 300 Level - Studio Emphasis		3
		*Apply for Baccalaureate		
		15		18
Fourth Year				
Fall	Credits		Spring	Credits
EDUC 482		3	EDUC 485	1
EDUC 486		3	EDUC 487	9
ART 489		3	EDUC 488	3
ART 400 Level - Studio Emphasis		3		
Gen Ed Science & Tech (S)		3		
*Capstone Exhibition				
*Apply to Student Teaching (Meeting TBA)				
*Complete Praxis Content and PTL exams				
		15		13

Total Credits: 124

Art Education

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**

701-231-8818

- **Department Web Site:**

www.ndsu.edu/visualarts/ (<http://www.ndsu.edu/visualarts/>)

- **Credential Offered:**

B.S.; B.A.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/art-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/art-education/#planofstudytext>)

Major Requirements

Major: Art Education

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Art Education Requirements		
ART 210	Art History I (May satisfy general education category A)	3
ART 211	Art History II (May satisfy general education category A)	3

Professional Education Requirements

EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Art)	3
EDUC 482	Classroom Practice/Methods of Teaching II:	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3

Teaching Specialty Requirements

Studies in Art History

ART 451	History of American Art	3
or ART 453	Topics in Art History	
ART 452	Contemporary Art	3

Studies in Studio

ART 120	Painting I	3
ART 122	Studio Technology Foundations	3
ART 124	Foundations of Design	3
ART 131	Foundations Drawing	3
ART 150	Ceramics I	3
ART 160	Sculpture I	3
ART 170	Printmaking I	3
ART 180	Photography I	3
ART 185	Graphic Design I	3
ART 230	Drawing II	3
ART 330	Drawing III	3
or ART 335	Figure Drawing	

Art Studio or Art History Elective: Select 3 credits 3

Intermediate Studio Course: Select one course from the following: 3

ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	
ART 270	Printmaking II	
ART 280	Digital Image and Output	
ART 285	Graphic Design and Digital Media	

Upper Division Studio Electives: Select one course from the following: 3

ART 320	Topics in Painting	
ART 350	Topics in Ceramics	
ART 360	Sculpture III	
ART 370	Topics in Printmaking	
ART 380	Topics in Photography	
ART 385	Advanced Topics in Graphic Design	
ART 420	Baccalaureate Studio: Painting	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Baccalaureate Studio: Ceramics	
ART 460	Sculpture IV	
ART 470	Baccalaureate Studio: Printmaking	
ART 480	Baccalaureate Studio: Photography	
ART 485	Baccalaureate Studio: Graphic Design	

ART 494	Individual Study (IS may be used toward the upper division studio electives. IS can be taken in Ceramics, Digital Media, Drawing, Painting, Photography, Printmaking, or Sculpture)	
Baccalaureate Project:		3
ART 489	Baccalaureate Project (Capstone)	
Total Credits		91

Degree Requirements and Notes

- Courses taken P/F may not be used to satisfy any requirements.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Banking

Department Information

- **Department Location:**
Barry Hall
- **Department Phone:**
701-231-5845
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/banking/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/banking/>)

Banks are the lifeblood of the economy. Today's commercial banks are more diverse than ever. Therefore there is a tremendous range of employment opportunities in this sector, starting at the branch level as a bank teller to a wide variety of other positions such as the credit analyst, personal banker, loan officer, mortgage originator, and so forth. As of January 2019, a total of 68,593 nationwide banking jobs are available on indeed.com (993 jobs in Minneapolis and 173 jobs in ND). Banks are actively recruiting management talent- especially in small and mid-sized towns.

Banking

Department Information

- **Department Location:**
Barry Hall
- **Department Phone:**
701-231-5845
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/banking/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/banking/>)

Minor Requirements

Minor: Banking

Required Credits: 18

Minor Requirements

Code	Title	Credits
ECON 105	Elements of Economics	3
or ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	3

FIN 320	Principles of Finance	3
FIN 430	Management of Financial Institutions	3
FIN 450	Advanced Bank Management	3
FIN 451	Credit Analysis	3
Total Credits		18

Notes:

- A minimum of eight credits must be earned in residence at NDSU.

Behavioral Statistics

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-8734
- **Department Email:**
ndsu.stats@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/statistics/ (<http://www.ndsu.edu/statistics/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/behavioral-statistics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/behavioral-statistics/#planofstudytext>)

Major Requirements

Major: Behavioral Statistics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6

Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{*†}	
Global Perspectives (G) ^{*†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. [*]		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences [*]		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Behavioral Statistics Requirements		
PSYC 111	Introduction to Psychology	3
PSYC Elective	200-400 Level Psychology Electives	6
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC Elective	400 Level Psychology Elective	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 470	Statistical SAS Programming	3
or STAT 471	Introduction to the R Language	
Select two courses from the following:		6
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 469	Introduction to Biostatistics	
STAT 472	Time Series	
Select one course from 3 of the following 4 groups (A-D)		
Group A - Social/Personality:		3
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
Group B - Perception/Cognition:		3
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
Group C - Biological Bases of Behavior:		3
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	

Group D - Individual Differences: 3

PSYC 463	Experimental Developmental Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	

Capstone Experience: Select one of the following courses or have completed one course from each of the 4 groups (A-D): 2-3

PSYC 480	History & Systems	
PSYC 489	Honors Thesis	

Related Courses Required

ANTH 111	Introduction to Anthropology (May satisfy general education category B and D)	3
BIOL 126	Human Biology (May satisfy general education category S)	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
MATH 103	College Algebra (or higher level if needed as a prerequisite)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3

Total Credits 64-65**Program notes**

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Behavioral Statistics

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-7532
- **Department Email:**
ndsu.stats@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/statistics/ (<http://www.ndsu.edu/statistics/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/behavioral-statistics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/behavioral-statistics/>)

This degree is a joint effort between the Department of Statistics (p. 1073) and the Department of Psychology (p. 1072). It is recommended that a student wishing to obtain a degree in Behavioral Statistics consult with an advisor in both departments. This major prepares students for careers involving collecting and analyzing data on human behavior, for example, in Medicare, insurance, market research, or health, educational and social services. Graduates of this program are expected to have good quantitative reasoning skills and to have strong people skills. **Note:** *this curriculum also fulfills requirements for the major in Psychology.*

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
MATH 103 (or higher level)		3 Humanities & Fine Arts Gen. Ed.	3
PSYC 111		3 Any 200 level PSYC class	3
Science & Technology Gen. Ed.		3 Science & Technology Gen. Ed.	3

Social & Behavioral Sciences Gen. Ed.		3 Science & Technology Lab		1
		Social & Behavioral Sciences Gen. Ed.		3
		15		16
Sophomore				
Fall	Credits	Spring	Credits	
STAT 330		3 STAT 331		2
200 level PSYC		3 PSYC 351		3
PSYC 350		3 COMM 110		3
Science & Technology Gen. Ed.		3 Humanities & Fine Arts Gen. Ed.		3
Wellness Gen. Ed.		2 Cultural Diversity Gen. Ed.		3
		14		14
Junior				
Fall	Credits	Spring	Credits	
Global Perspectives Gen. Ed.		3 Hum/Soc. Science Elective		3
200- 400 Level PSYC Elective		3 PSYC Behavior Elective		3
200- 400 Level PSYC Elective		3 PSYC Behavior Elective		3
Hum/Soc. Science Elective		3 STAT Elective		3
PSYC Behavior Elective		3 STAT Elective		3
		15		15
Senior				
Fall	Credits	Spring	Credits	
400 level PSYC class		3 PSYC 480, 489, or STAT 491		3
STAT 462		3 STAT 470 or 471		3
Elective		4 Elective		3
Elective		3 Elective		3
Elective		3 Elective		3
		16		15
Total Credits: 120				

Biochemistry and Molecular Biology

Department Information

- **Department Location:**
Ladd Hall
- **Department Phone:**
701-231-8694
- **Department Email:**
nds.chemistry@nds.edsu.edu
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/biochemistry-molecular-biology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/biochemistry-molecular-biology/>)

Biochemistry is concerned with the chemistry of the materials fundamental to life and contributes toward the understanding of the structure and functioning of all organisms. Because of the rapid advances in the areas of biotechnology, molecular biology and genetic engineering, biochemistry is an exciting area for study and research.

Background Information

The undergraduate program in biochemistry at North Dakota State University is planned for students who are seeking careers in the life sciences, agriculture, medicine or health related fields. The program is also suited for students who are contemplating advanced graduate degrees in biochemistry, botany, zoology and microbiology, or professional degrees in dentistry and medicine.

The biochemistry program is offered by the Department of Chemistry and Biochemistry.

The Program

Students with an interest in biochemistry earn the Bachelor of Science degree in biochemistry and molecular biology. This provides flexibility in the selection of courses for those students who plan to seek employment in areas related to biochemistry, enter graduate or medical school, or teach in high schools or higher education institutions. The program provides training in biochemistry, botany, microbiology, zoology or in applied areas according to the student's interest. In addition to the courses in chemistry, physics and mathematics, an additional 16 credits in biological sciences, 18 credits of electives in the humanities and social sciences, nine credits in English, three credits in speech and two credits in wellness are required. The pre-medical student is encouraged to take a year of upper-level zoology.

All undergraduates in biochemistry and molecular biology receive assistance in planning and scheduling classes from faculty advisors. In addition to course work and laboratory courses, students also have the opportunity to learn by conducting research in various areas of biochemistry under faculty guidance.

Faculty and Facilities

The Department of Chemistry and Biochemistry is well staffed with 17 faculty members. All of the faculty have doctorate degrees from well-known universities. Most of them have considerable experience in postdoctoral or industrial research.

The research and teaching facilities for the department are housed in four buildings— A. Glenn Hill Center, Ladd Hall, Dunbar Laboratories, and the Quentin Burdick Building.

Advanced instruments and facilities are readily available. These include ultracentrifuges; gene synthesizer; nuclear magnetic, infrared, ultraviolet and mass spectrometers; gas and liquid chromatographs; computers; recombinant DNA and cell and tissue culture laboratories; and an advanced electron microscope facility.

Career Opportunities

Employment opportunities for biochemists are found at higher education institutions within the chemistry, biochemistry and biological sciences departments; in medical schools, hospitals, research institutes and government research laboratories; and in other health, energy, environment and agricultural research programs. Biochemists are employed at all levels in industries concerned with food processing, manufacturing, genetic engineering and marketing of drugs, cosmetics and pesticides, as well as in the petroleum and allied industrial complexes.

Earnings of persons trained in biochemistry vary, and the salary level depends largely upon the amount of formal training a person has received. Entry-level salaries for biochemists average \$44,100 per year, based on 2016 data from www.payscale.com. For biochemists who have an advanced degree, salaries and opportunities are much greater.

High School Preparation

A strong high school background in English, mathematics (through trigonometry, if possible), biology, chemistry and physics is recommended.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
BIOL 150 & 150L		4 MATH 166	4
CHEM 150 or 121		3 CHEM 151 or 122	3
CHEM 160 or 121L		1 CHEM 161 or 122L	1
ENGL 110 (Communication Gen Ed)		3 ENGL 120 (Communication Gen Ed)	3

MATH 165 (Quant. Reasoning Gen Ed)		4 Humanities/Fine Arts Gen Ed	3
		Social & Behavioral Sci Gen Ed	3
		15	17
Sophomore			
Fall	Credits	Spring	Credits
COMM 110 (Communication Gen Ed)		3 PHYS 252 & 252L (Science & Tech Gen Ed)	5
CHEM 341		3 CHEM 342	3
CHEM 353		1 CHEM 354	2
BIOL 315		3 Humanities/Fine Arts and Global Perspectives Gen Ed	3
PHYS 251 & 251L (Science & Tech Gen Ed)		5 Social & Beh Sci and Cultural Diversity Gen Ed	3
		15	16
Junior			
Fall	Credits	Spring	Credits
BIOC 460		3 CHEM 380	1
BIOC 460L		1 BIOC 461	3
CHEM 431		3 BIOC 474	3
MICR 350 & 350L		5 STAT 330	3
ENGL 321 or 324 (Communication Gen Ed)		3 300-400 Level Science Elective ¹	3
		300-400 Level Science Elective ¹	3
		15	16
Senior			
Fall	Credits	Spring	Credits
BIOC 473		3 BIOC 487	3
BIOC 483		3 CHEM 491	2
CHEM 465		4 300-400 Level Science Electives ¹	3
Humanities or Social Science College Requirement ²		3 Humanities or Social Science College Requirement ²	3
		Wellness Gen Ed	2
		13	13
Total Credits: 120			

¹ Courses in BIOL, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494) may count towards 3 of these credits.

² Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education in the humanities & fine arts and the social & behavioral sciences categories (A & B). These credits must come from outside the department of the student's major.

Biochemistry and Molecular Biology

Department Information

- **Department Location:**
Ladd Hall
- **Department Phone:**

701-231-8694

- **Department Email:**
ndsu.chemistry@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/biochemistry-molecular-biology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/biochemistry-molecular-biology/#planofstudytext>)

Major Requirements

Major: Biochemistry & Molecular Biology

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Biochem & Molecular Biology Requirements		
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 473	Methods of Biochemical Research	3
BIOC 474	Methods of Recombinant DNA Technology	3
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations	3
BIOC 487	Molecular Biology of Gene Expression	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Select one of the following:		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one of the following:		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 465	Survey of Physical Chemistry	4
CHEM 380	Chemistry Junior Seminar	1
CHEM 431	Analytical Chemistry I	3
CHEM 491	Seminar	2
ENGL 321 or ENGL 324	Writing in the Technical Professions (May satisfy general education category C) Writing in the Sciences	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
STAT 330	Introductory Statistics (May satisfy general education category R)	3
BIOL 315 or PLSC 315	Genetics Genetics	3

Upper-Level Science Electives

300-400 level courses in BIOL, BIOC, BOT, ZOO, CHEM, CSCI, MICR, PSCI, PHYS, PPTH, or STAT. No more than 6 credits from one prefix may apply. Research credits (CHEM 494/BIOC 494; CHEM 493/BIOC 493) may count towards 3 of these credits.

9

Total Credits

91

* CHEM 364 Physical Chemistry I & CHEM 365 Physical Chemistry II will satisfy this requirement and 2 credits of upper-level science electives.

Degree Notes:

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements**Minor: Biochemistry and Molecular Biology**

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Biochemistry adviser.		16
Total Credits		16

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- The student and adviser will complete a substitution form with the courses to be used for the biochemistry minor. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection.

Biological Sciences**Department Information**

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences/>)

Biological sciences is a comprehensive field that prepares students for a variety of careers. Growing human populations, the increasing impacts associated with human activities, and heightened expectations of health and environmental quality are resulting in new career opportunities in the Biological Sciences. These fields are growing, and our students finish their degrees well prepared to excel in these careers. The program provides hands-on experience in biological research and focuses on student experience and interests. This represents an exciting, rewarding area of science, which requires an especially strong academic background and an ability to think both analytically and comprehensively.

CAREER Opportunities

A major in Biological Sciences provides an excellent foundation for a variety of careers. Our students continue on for careers as medical doctors, optometrists, dentists, genetic counselors, state and federal wildlife biologists, naturalists, wildlife rehabilitators, directors of zoological parks, conservation biologists, environmental consultants, teachers, and researchers. Students leave well-prepared to continue in graduate degree programs that require a solid background in the biological sciences. In fact, most professional scientists can anticipate graduate education as being essential for career advancement.

High School Preparation

High school students should take year-long courses in biology, chemistry, physics, algebra, advanced algebra, geometry and trigonometry. If available, an advanced science course and pre-calculus are encouraged. There should be an above-average performance in such course work, as well as in the student's overall high school program. An ACT composite score of 24 or higher also is suggested.

The Program

With its many areas of emphasis, the program integrates studies in zoology, botany, and biological sciences and offers students the flexibility to customize their field of study to align course selection with educational and professional goals. The program integrates broad-based biology foundation classes with specializations, such as biomedical science or conservation biology, in later years. With appropriate course selection, the biological sciences degree provides a broad understanding of the complex relationship between the living and nonliving world. Students choose a research-based course in biology that focuses on antibiotics, wild-life ecology and conservation, STEM education, or genomics. Students also have the option to choose an emphasis in Biomedical Science, Ecology and Conservation Science, or Environmental Science. Students planning to enter a health-professional program, such as medical school, should refer to the plan of study for the Biomedical Science emphasis.

Related Experiences

Career opportunities are enhanced by work experiences and extra-curricular involvement. Part-time, science-related work experiences are available in several North Dakota State University departments, as well as at the nearby U.S. Department of Agriculture laboratories. Off-campus work, such as summer employment with public agencies or private organizations, is especially valuable and has sometimes been the entry point for a first permanent position after graduation. NDSU offers many extra-curricular activities, including science-related organizations such as the Pre-Med Club, the Student Chapter of the Wildlife Society, the Natural Resources Management Club, and the Range Science Club.

Accelerated Program

The Department of Biological Sciences now offers an Accelerated Bachelor and Master of Science program. The program allows students to begin thesis research during their junior year and simultaneously pursue their Bachelor of Science and Master of Science degrees in biological sciences. Students will work closely with a faculty member in our department who will serve as a mentor. The program is designed to produce a research-based master's degree. Students must be at junior standing with a minimum cumulative GPA of 3.5.

Emphases Available

A Biological Sciences degree is available in a traditional broad-based sequence or with an emphasis on Biomedical Science, Ecology and Conservation Science, or Environmental Science. There are also minors available in Biological Sciences, Zoology, and Botany.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 189		1 BIOL 151 & 151L	4
BIOL 150 & 150L		4 CHEM 122 & 122L	4
CHEM 121 & 121L		4 ENGL 120	3
ENGL 110		3 MATH 146 or 165	4
MATH 103		3	
		15	15
Second Year			
Fall	Credits	Spring	Credits
BIOL 315 & 315L		4 PHYS 120 or 211 <i>and</i> 211L <i>and</i> 212 <i>and</i> 212L	3
BIOL 270, 271, 272, 273, 274, or 275		3 BIOL 364 or 370	3
CHEM 240, 341 <i>and</i> 341L, or 342 <i>and</i> 342L		3-4 Social & Behavioral Sciences Gen Ed	3
COMM 110		3 Wellness Gen Ed	2

STAT 330	3	BIOL 359	3
		Free elective	3
16-17			17
Third Year			
Fall	Credits	Spring	Credits
BIOL 300-400 Elective		3 BIOL 300-400 Elective	3
ENGL 324		3 Free Elective	6
Free Elective		6 CSM requirement	3
Humanities & Fine Arts/Cultural Diversity Gen Ed		3 Social & Behavioral Science/Global Diversity Gen Ed	3
15			15
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 300-400 Elective		6 BIOL 300-400 Elective	3
Free Elective		6 Free Elective	6
Humanities & Fine Arts Gen Ed		3 CSM requirement	3
15			12
Total Credits: 120-121			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

biomedical science emphasis

First Year			
Fall	Credits	Spring	Credits
BIOL 189		1 BIOL 151	3
BIOL 150		3 BIOL 151L	1
BIOL 150L		1 CHEM 122	3
CHEM 121		3 CHEM 122L	1
CHEM 121L		1 MATH 146	4
MATH 103		3 ENGL 120	3
ENGL 110		3	
15			15
Second Year			
Fall	Credits	Spring	Credits
BIOL 315		3 BIOL 270 or 274	3
BIOL 315L		1 CHEM 342	3
BIOL 370		3 CHEM 342L	1
CHEM 341		3 PSYC 111 (Soc/Beh Gen Ed)	3
CHEM 341L		1 SOC 110 (Soc/Beh Gen Ed)	3
COMM 110		3 Free elective	3
STAT 330		3	
17			16

Third Year			
Fall	Credits	Spring	Credits
PHYS 211		3 BIOL 359	3
PHYS 211L		1 PHYS 212	3
BIOC 460		3 PHYS 212L	1
ENGL 324		3 Recommended Pre-Requisite	3
Wellness Gen Ed		2 Humanities and Fine Arts/Cultural Diversity Gen Ed	3
BIOL 300-400		3	
		15	13
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 300-400 Elective		6 BIOL 300-400 Elective	6
Recommended pre-requisite		3 Recommended Pre-Requisite	6
Humanities and Fine Arts/Global Perspective Gen Ed		3 College Requirement	3
College Requirement		3	
		15	15
Total Credits: 121			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

ecology and conservation emphasis

First Year			
Fall	Credits	Spring	Credits
BIOL 189		1 BIOL 151	3
BIOL 150		3 BIOL 151L	1
BIOL 150L		1 CHEM 122	3
MATH 103		3 CHEM 122L	1
CHEM 121		3 MATH 146	4
CHEM 121L		1 ENGL 120	3
ENGL 110		3	
		15	15
Second Year			
Fall	Credits	Spring	Credits
CHEM 240		3 PHYS 120	3
BIOL 271 or 275		3 BIOL 359	3
BIOL 315		3 Free elective	3
BIOL 315L		1 General Education Social	3
STAT 330		3 General Education Humanities	3
COMM 110		3	
		16	15

Third Year			
Fall	Credits	Spring	Credits
BIOL 364		3 BIOL 300-400 Elective	3
BIOL 475 or 476		3 ENGL 324	3
General Education Social		3 CSM Social/Humanities Requirement	3
General Education Wellness		3 General Education Global	3
Free elective		3 Free elective	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 300-400 Elective		3 BIOL 300-400 Elective	3
BIOL 300-400 Elective		3 General Education Humanities	3
General Education Cultural		3 Free elective	9
CSM Social/Humanities requirement		3	
Free elective		3	
		15	15
Total Credits: 121			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

environmental science emphasis

First Year			
Fall	Credits	Spring	Credits
BIOL 189		1 BIOL 151	3
BIOL 150		3 BIOL 151L	1
BIOL 150L		1 MATH 146	4
MATH 103		3 CHEM 122	3
CHEM 121		3 CHEM 122L	1
CHEM 121L		1 ENGL 120	3
ENGL 110		3	
		15	15
Second Year			
Fall	Credits	Spring	Credits
BIOL 315		3 BIOL 359	3
BIOL 315L		1 BIOC 260	4
CHEM 240		3 SOIL 210	3
COMM 110		3 General Education Wellness	2-3
STAT 330		3 General Education Humanities	3
BIOL 271, 270, 272, 273, 274, or 275		3	
		16	15-16

Third Year			
Fall	Credits	Spring	Credits
BIOL 364		3 BIOL 480 ^{Spring even years}	3
GEOL 105		3 BIOL 300-400 Elective	3
GEOL 105L		1 GEOL 106	3
PHYS 211		3 GEOL 106L	1
PHYS 211L		1 PHYS 212	3
BIOL Plant course requirement from list		3 PHYS 212L	1
General Education Humanities/Cultural Diversity		3 General Education Social	3
		17	17
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 300-400 Elective		3 BIOL 300-400 Elective	3
BIOL 300-400 Elective		3 SOIL 410	3
GEOL 428 or CHEM 431 <i>and</i> CHEM 431L		3 CSM Social/Humanities Elective	3
ENGL 324		3 General Education Social	3
CSM Social/Humanities Requirement		3	
		15	12

Total Credits: 122-123

Biological Sciences

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/biological-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/biological-science/>)

Major Requirements

Major: Biological Sciences

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
- b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail

Code	Title	Credits
Biological Sciences Core Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category s)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
MATH 146 or MATH 165	Applied Calculus I (May satisfy general education category R) ² Calculus I	4
STAT 330	Introductory Statistics	3
BIOL 189	Skills for Academic Success ¹	1
BIOL 270 or BIOL 271 or BIOL 272 or BIOL 273 or BIOL 274 or BIOL 275	Undergraduate Research Experience: Antibiotic Discovery Undergraduate Research Experience: Field Biology and Experimental Ecology Undergraduate Research Experience: Learning in Biology Undergraduate Research Experience: Genomic Analysis Undergraduate Research Experience: Biomedical Research Analysis Undergraduate Research Experience: Insect Behavior	3
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
Select one of the emphasis areas listed below to complete the major requirements		29-59
Total Credits		63-93

¹ BIOL 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take BIOL 189.

² Students interested in graduate programs that require 2 semesters of calculus should take MATH 165 and 166.

Standard emphasis

Code	Title	Credits
BIOL 364 or BIOL 370	General Ecology Cell Biology	3
Select one from the following:		3 or 8
CHEM 240	Survey of Organic Chemistry (or)	
CHEM 341 & 341L & CHEM 342 & CHEM 342L	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics (or)	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory	
Select 15 credits of any 300-400 level course offered in the department		15
BIOL 364	General Ecology (if not used to meet the above requirement)	
BIOL 370	Cell Biology (if not used to meet the above requirement)	
BIOL 379	Study Tour Abroad	
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Systematics	
BIOL 444	Vertebrate Histology	
BIOL 450	Invertebrate Zoology	

BIOL 452	Ichthyology
BIOL 454	Herpetology
BIOL 456	Ornithology
BIOL 458	Mammalogy
BIOL 460	Animal Physiology
BIOL 461	Plant Ecology
BIOL 462	Physiological Ecology
BIOL 463	Animal Behavior
BIOL 464	Endocrinology
BIOL 465	Hormones and Behavior
BIOL 470	Freshwater Ecology and Limnology
BIOL 472	Structure and Diversity of Plants and Fungi
BIOL 475	Conservation Biology
BIOL 476	Wildlife Ecology and Management
BIOL 477	Wildlife and Fisheries Management Techniques
BIOL 479	Biomedical Genetics and Genomics
BIOL 480	Ecotoxicology
BIOL 481	Wetland Science
BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases

Total Credits**24-34****Biomedical sciences emphasis**

Code	Title	Credits
BIOL 370	Cell Biology	3
CHEM 341	Organic Chemistry I	3
CHEM 341L	Organic Chemistry I Laboratory	1
CHEM 342	Organic Chemistry II	3
CHEM 342L	Organic Chemistry II Laboratory	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1
PHYS 212	College Physics II	3
PHYS 212L	College Physics II Laboratory	1
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
Select 12 credits from the following - at least 9 credits must have BIOL prefix		12
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOL 444	Vertebrate Histology	
BIOL 460	Animal Physiology	
BIOL 464	Endocrinology	
BIOL 465	Hormones and Behavior	
BIOL 479	Biomedical Genetics and Genomics	
BIOL 482	Developmental Biology	
BIOL 483	Cellular Mechanisms of Diseases	
MICR 350	General Microbiology	
MICR 460	Pathogenic Microbiology	
MICR 470	Basic Immunology	
BIOL Course	Choose one additional 3 credit 300-400 level BIOL course offered by the department	3
Total Credits		37

ecology and conservation Science emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
Select one from the following:		3 or 8
CHEM 240	Survey of Organic Chemistry	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
& CHEM 342 & CHEM 342L	and Organic Chemistry II and Organic Chemistry II Laboratory	
Select one from the following:		3 or 8
PHYS 120	Fundamentals of Physics	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
& PHYS 212 & PHYS 212L	and College Physics II and College Physics II Laboratory	
Select 9 credits from the following - at least 6 credits must have a BIOL prefix		9
BIOL 414	Plant Systematics	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 470	Freshwater Ecology and Limnology	
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 475	Conservation Biology (if not used to meet the above requirement)	
BIOL 476	Wildlife Ecology and Management (if not used to meet the above requirement)	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
RNG 450	Range Plants	
ENT 350	General Entomology	
ENT 470	Insect Ecology	
MICR 350	General Microbiology	
MICR 452	Microbial Ecology	
MICR 460	Pathogenic Microbiology	
PPTH 460	Fungal Biology	
PLSC 433	Weed Biology and Ecology	
SOIL 351	Soil Ecology	
BIOL Course	Choose one additional 3 credit 300-400 level BIOL course offered by the department	3
Total Credits		24-34

environmental science emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 480	Ecotoxicology	3
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1

GEOL 106L	The Earth Through Time Lab	1
GEOL 106	The Earth Through Time	3
PHYS 211L	College Physics I Laboratory	1
PHYS 211	College Physics I	3
PHYS 212L	College Physics II Laboratory	1
PHYS 212	College Physics II	3
SOIL 210	Introduction to Soil Science	3
SOIL 410	Soils and Land Use	3
Select one from the following:		3
PLSC 380	Principles of Plant Physiology	
BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BIOL 472	Structure and Diversity of Plants and Fungi	
RNG 450	Range Plants	
Select one of the following sequences:		3 or 8
CHEM 240 & BIOC 260	Survey of Organic Chemistry and Elements of Biochemistry (or)	
CHEM 341 & 341L & CHEM 342 & BIOC 460	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II and Foundations of Biochemistry and Molecular Biology I	
Choose one of the following:		3 or 8
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory (or)	
GEOL 428	Geochemistry	
BIOL Courses	Choose an additional 12 credits of 300 - 400 level BIOL courses offered by the department	12
Total Credits		49-59

Degree and Program Note:

- *Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Botany or Zoology minors. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.*

Minor Requirements

Minor: Biological Sciences

Required Credits: 17

Minor Requirements

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
BIOL 359	Evolution	3
Select one of the following:		3
BIOL 364	General Ecology	
BIOL 370	Cell Biology	
Electives: Select one of the 300-400 level courses listed below		3
BIOL 364	General Ecology (if not used above)	
BIOL 370	Cell Biology (if not used above)	
BIOL 410	Comparative Chordate Morphology	
BIOL 414	Plant Systematics	
BIOL 444	Vertebrate Histology	

BIOL 450	Invertebrate Zoology
BIOL 452	Ichthyology
BIOL 454	Herpetology
BIOL 456	Ornithology
BIOL 458	Mammalogy
BIOL 460	Animal Physiology
BIOL 461	Plant Ecology
BIOL 462	Physiological Ecology
BIOL 463	Animal Behavior
BIOL 464	Endocrinology
BIOL 465	Hormones and Behavior
BIOL 470	Freshwater Ecology and Limnology
BIOL 472	Structure and Diversity of Plants and Fungi
BIOL 475	Conservation Biology
BIOL 476	Wildlife Ecology and Management
BIOL 477	Wildlife and Fisheries Management Techniques
BIOL 479	Biomedical Genetics and Genomics
BIOL 480	Ecotoxicology
BIOL 481	Wetland Science
BIOL 482	Developmental Biology
BIOL 483	Cellular Mechanisms of Diseases

Total Credits**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Classes taken for the biological sciences minor cannot be double-counted with courses taken to fulfill botany and/or zoology minors. The credits must be unique from courses used to fulfill the biological sciences minor. The only classes that can be double counted are BIOL 150/L, 151/L, and 359.

Biological Sciences Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/biological-sciences-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/biological-sciences-education/#planofstudytext>)

Major Requirements

Major: Biological Sciences Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
BIOL 370	Cell Biology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category G)	4

GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Pick one of the following math classes:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Pick one of the following:		4
PHYS 120 & 120L	Fundamentals of Physics and Fundamentals of Physics Laboratory	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
SOIL 217	Introduction to Meteorology & Climatology	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		98-99

Degree Requirements and Notes

- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Zoology minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.

Biological Sciences Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/biological-sciences-education/>)

Biological sciences, in the broadest sense, is the study of life in the natural world. As such, it is a subject of great diversity and requires a background in many academic disciplines. Teaching biological sciences in middle or secondary schools requires deep knowledge of (a) science content, (b)

current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Accordingly, the biological sciences education major combines coursework in biology and related sciences with professional education courses on teaching and learning.

The Program

Candidates in biological sciences education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before applying to be formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

STUDENT TEACHING

Student teaching (clinical practice) is the culmination of the teacher preparation program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced classroom teachers in middle or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

STUDENT ADVISEMENT

Biological sciences teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in biological sciences in most states. Students who take the Praxis Subject Assessment exam for Biology will be licensed to teach biology and related secondary courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPb).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 150 & 150L		4 BIOL 151 & 151L	4
ENGL 110 (or 120 College Composition II based on placement)		3 COMM 110	3
GEOL 105 & 105L (Global Perspectives Gen Ed requirement)		4 ENGL 120	3
MATH 105 or 146		3-4 GEOL 106 & 106L	4
		Social & Behavioral Science Gen Ed*	3

Second Year			
Fall	Credits	Spring	Credits
BIOL 220 & 220L		4 BIOL 221 & 221L	4
CHEM 121 & 121L		4 BIOL 252	3
EDUC 321		3 CHEM 122 & 122L	4
MICR 202 & 202L		3 EDUC 322	3
Humanities & Fine Arts Gen Ed*		3 Social & Behavioral Sciences Gen Ed*	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		17	17
Third Year			
Fall	Credits	Spring	Credits
BIOL 315 & 315L		4 BIOL 359	3
BIOL 364		3 EDUC 481	3
EDUC 451		3 EDUC 486	3
PHYS 120 & 120L		4 SOIL 217	3
Wellness Gen Ed		2 STAT 330	3
		16	15
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 370		3 EDUC 485	1
Apply for Student Teaching		EDUC 487	9
EDUC 482		3 EDUC 488	3
EDUC 489		3	
ENGL 324		3	
Humanities & Fine Arts Gen Ed*		3	
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
		15	13
Total Credits: 124-125			

* One of these General Education courses needs to be selected from Category D - Cultural Diversity.

Biomedical Engineering

Department Information

- **Department Phone:**
701-231-8839
- **Department Web Site:**
www.ndsu.edu/coe/bme/ (<http://www.ndsu.edu/coe/bme/>)
- **Credential Offered:**
Minor

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/biomedical-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/biomedical-engineering/>)

Biomedical engineering is highly relevant to the 21st century research and education needs of the citizens of North Dakota and providing opportunity to students in one of the highest demand fields today. The current high quality education received by engineering students at NDSU will be augmented with the biomedical engineering minor allowing graduates to more readily be able to contribute to the global demand for medical technologies and innovations. Employers are supportive and encouraging the addition of biomedical minor at NDSU.

Biomedical Engineering

Department Information

- **Department Phone:**
701-231-8839
- **Department Web Site:**
www.ndsu.edu/coe/bme (<http://www.ndsu.edu/coe/bme/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/biomedical-engineering/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/biomedical-engineering/>)

Minor Requirements

Minor: Biomedical Engineering

Required Credits: 21

Minor Requirements

Code	Title	Credits
Core Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BIOL 370 or BIOL 460	Cell Biology Animal Physiology	3
Elective Requirements (at least 9 of the 11 credits must be courses with an engineering prefix)		11
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
BIOL 221	Human Anatomy and Physiology II	
BIOL 221L	Human Anatomy and Physiology II Laboratory	
BIOL 370	Cell Biology (if not used in the core)	
BIOL 460	Animal Physiology (if not used in the core)	
CE 486	Nanotechnology and Nanomaterials	
ECE 483	Instrumentation for Engineers	
ECE 485	Biomedical Engineering	
ECE 487	Cardiovascular Engineering	
ECE 488	Cardiovascular Engineering II	
IME 411	Human Factors Engineering	
IME 453	Hospital Management Engineering	
ME 331	Materials Science and Engineering	
ME 468	Introduction to Biomechanics	
ME 480	Biofluid Mechanics	
ME 486	Nanotechnology and Nanomaterials	
MICR 445	Animal Cell Culture Techniques	

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Course pre-requisites apply.
- At least 12 credits that apply to this minor must be unique from courses that apply to the student's major.

Biotechnology

Department Information

- **Department Location:**
Van Es Hall
- **Department Phone:**
701-231-8892
- **Department Web Site:**
www.ndsu.edu/majors/biotech/ (<http://www.ndsu.edu/majors/biotech/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/biotechnology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/biotechnology/>)

Biotechnology is an interdisciplinary field that uses a combination of biology and technology to design and produce new molecules, plants, animals and microorganisms with improved characteristics. Biotechnology offers seemingly unlimited opportunities to combine genes from related or unrelated species to produce useful organisms with desirable properties that were not previously found in nature.

Background

Biotechnology may be thought of as a collection of technologies using animal and/or plant cells, biological molecules, molecular biology processes and genetic engineering for applications in medicine, agriculture and the pharmaceutical industry. The technologies include the use of recombinant DNA for gene cloning and gene transfers between organisms; culture of plant and animal cells and tissues; fusion of animal cells or plant protoplast; the regeneration of whole plants from single cells and the large-scale fermentation processes that use some of these novel organisms for the production of pharmaceuticals, diagnostic tests for diseases, feed additives, enzymes and hormones.

Examples of successful biotechnology include the development of crop plants that are resistant to herbicides or insects, the production of human growth hormone and insulin by genetically engineered bacteria and the development of unique vaccines.

The Program and Curriculum

The biotechnology program is offered through both the College of Agriculture, Food Systems, and Natural Resources and the College of Science and Mathematics and leads to a Bachelor of Science degree.

The recommended course of study includes both the education in science and mathematics, as well as introduction to the special skills that are needed to enter the rapidly expanding and changing field of biotechnology. In addition to the required courses, students may select from a variety of specialized elective science courses to help develop a particular area of interest. Students majoring in biotechnology are required to either complete an internship or perform a research project in the laboratory of a faculty advisor. The results of the research project are incorporated into a senior thesis.

The Faculty and Facilities

A faculty advisor is assigned to each student to assist in scheduling, registration and career development. Faculty in each of the cooperating life-science departments have been identified to serve as academic and research advisors for students who select the biotechnology major. The faculty advisor and the director of the biotechnology program regularly review the progress of each student.

The faculty who advise, teach and serve as research mentors for the biotechnology program are spread among several academic departments in the College of Agriculture, Food Systems, and Natural Resources, the College of Science and Mathematics and the College of Health Professions. The departments include plant sciences; biological sciences, biology, chemistry, biochemistry and molecular biology; animal and range sciences; plant pathology; veterinary and microbiological sciences; and pharmaceutical sciences. Several scientists at the North Dakota State University Center for Nanoscale Science and Engineering and at the on-campus USDA facilities also serve as research mentors.

Laboratory facilities and specialized equipment are used for instruction and research. These include animal and plant tissue culture facilities, small animal housing, electron and confocal microscopes, automated DNA sequencing equipment, equipment for performing microarray experiments, and

NDSU Core Labs. The Core Labs are shared cutting-edge research facilities and include the Advanced Imaging and Microscopy Core, Core Biology Facility, Core Synthesis and Analytical Services and the Electron Microscopy Core Laboratory, among many other state-of-the-art facilities and equipment.

Career Opportunities

Biotechnology continues to rapidly develop into new research areas. Surveys indicate there will be a continuing high demand for well-educated personnel. Job opportunities are found in life science departments in colleges and universities; private and government research institutes; food production, pharmaceutical and agri-chemical industries; and in the biotechnology industries. Graduates of this program have the educational background and laboratory experience to take advantage of any of these job opportunities. Graduates of the biotechnology program are now successful and productive scientists at pharmaceutical, agri-chemical and biotechnology companies, and at government and private research institutions throughout the country.

The majority (approximately 60 percent) of graduates from the biotechnology program choose to continue their education in graduate or professional schools. Graduates of the biotechnology program have earned master's and doctoral degrees in many diverse areas, including cellular and molecular biology, biology, microbiology, plant sciences, animal physiology, cancer biology and virology at many of the most respected universities in the United States. Graduates of our program are now established and productive professors, physicians and veterinarians.

High School Preparation

Students entering the biotechnology program should have a strong background in mathematics, including trigonometry, biology, chemistry, physics, writing and computer courses. A composite ACT score of 26 or higher is recommended.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
MICR 189		1 Humanity or Social/Behavioral Science GE	3
ENGL 110		3 ENGL 120	3
MATH 165		4 BIOL 151	3
BIOL 150		3 BIOL 151L	1
BIOL 150L		1 CHEM 122	3
CHEM 121		3 CHEM 122L	1
CHEM 121L		1	
		16	14
Second Year			
Fall	Credits	Spring	Credits
COMM 110		3 Wellness GE	2
STAT 330		3 Humanities/Fine Arts GE	3
MICR 350		3 CHEM 342	3
MICR 350L		2 PLSC 315	3
CHEM 341		3 PLSC 315L	1
CHEM 341L		1 MICR 445	2
		15	14
Third Year			
Fall	Credits	Spring	Credits
Social/Behavioral Sciences GE		3 Humanities/Fine Arts GE	3
PHYS 211		3 Upper Division Writing GE	3
PHYS 211L		1 PHYS 212	3
BIOC 460		3 PHYS 212L	1

MICR 470	3	BIOC 461	3
MICR 471	2	MICR 480	3
15		16	
Fourth Year			
Fall	Credits	Spring	Credits
Social/Behavioral Sciences GE		3 Global Perspectives GE	3
CHEM 431		3 CSCI 114	3
BIOC 487		3 BIOC 474	3
MICR 482		3 MICR 491	1
MICR 493		2 MICR 494 (Biotechnology Senior Thesis) A three-credit internship may be substituted for the Research/Thesis requirement	1
Elective		2 Cultural Diversity GE	3
16		14	

Total Credits: 120

Biotechnology

Department Information

- **Department Location:**
Van Es Hall
- **Department Phone:**
701-231-8892
- **Department Web Site:**
www.ndsu.edu/majors/biotech/ (<http://www.ndsu.edu/majors/biotech/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/biotechnology/#planofstudytext>)

Major Requirements

Major: Biotechnology

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major requirements

Code	Title	Credits
Biotechnology Requirements		
MICR 189	Skills for Academic Success ¹	1
CSCI 114	Computer Applications	3
or CSCI 122	Visual BASIC	
MATH 165	Calculus I	4
PHYS 211	College Physics I	4
& 211L	and College Physics I Laboratory	
PHYS 212	College Physics II	3
& 212L	and College Physics II Laboratory	
STAT 330	Introductory Statistics (May satisfy general education category R)	3
BIOL 150	General Biology I	4
& 150L	and General Biology I Laboratory	
BIOL 151	General Biology II	4
& 151L	and General Biology II Laboratory	
PLSC 315	Genetics	4
& 315L		
CHEM 121	General Chemistry I	4
& 121L	and General Chemistry I Laboratory (May satisfy general education category S)	
CHEM 122	General Chemistry II	4
& 122L	and General Chemistry II Laboratory (May satisfy general education category S)	
CHEM 341	Organic Chemistry I	4
& 341L	and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 474	Methods of Recombinant DNA Technology	3
MICR 350	General Microbiology	5
& 350L	and General Microbiology Lab	
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2

MICR 482	Microbial Genetics	3
MICR 491 or BIOC 491	Seminar (Biotechnology) Seminar	1-2
Choose one of the following:		3
MICR 493 & MICR 494	Undergraduate Research and Individual Study (2-4 cr. of 493 (research) and 1 cr. of 494 (thesis)) <small>The research and thesis may also be completed as BIOC or PLSC</small>	
MICR 497	FE/Coop Ed/Internship	
Major Elective in Physiology: Select 3 credits from the following:		3
MICR 480	Microbial Physiology	
PLSC 380	Principles of Plant Physiology	
ZOO 460	Animal Physiology	
Major Elective in Biotechnology Technique: Select 7-9 credits from the following:		7-9
BIOC 473	Methods of Biochemical Research	
BIOC 487	Molecular Biology of Gene Expression	
CHEM 431	Analytical Chemistry I	
MICR 445	Animal Cell Culture Techniques	
PLSC 411	Genomics	
PLSC 484	Plant Tissue Culture and Biotechnology	
Additional Humanities & Fine Arts or Social & Behavioral Sciences Credits		6
An additional 6 credits from these General Education categories is required for earning a B.S. degree from either the College of Agriculture, Food Systems, and Natural Resources or the College of Science and Mathematics.		
Total Credits		87-90

- ¹ MICR 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

Degree Notes:

- The Bachelors of Science degree is the default degree type for this program of study. However, a Bachelor of Arts degree is available if the degree is being earned from the College of Science & Mathematics.
- Bachelor of Arts (B.A.) Degree Requirements: An additional 12 credits of Humanities and/or Social Sciences courses and proficiency of a modern foreign language at the second year level (example: SPAN 201 & 202). Courses for the Humanities and/or Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the current Humanities & Fine Arts (A) and/or Social & Behavioral Sciences (B) General Education list.

Minor Requirements

Minor: Biotechnology

Required Credits: 20

Minor Requirements

Code	Title	Credits
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Biotechnology Technique Electives: Select 4 credits from the following:		4
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
MICR 445	Animal Cell Culture Techniques	
PLSC 484	Plant Tissue Culture and Biotechnology	
Specialized Electives: Select 6 credits from the following:		6
MICR 470	Basic Immunology	

MICR 471	Immunology and Serology Laboratory
MICR 482	Microbial Genetics
PPTH 324	Introductory Plant Pathology
PLSC 380	Principles of Plant Physiology
ZOO 370	Cell Biology
ZOO 460	Animal Physiology

Total Credits**20**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Botany

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/botany/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/botany/>)

Minor Requirements

Minor: Botany

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150	General Biology I	3
BIOL 150L	General Biology I Laboratory	1
BIOL 151	General Biology II	3
BIOL 151L	General Biology II Laboratory	1
BIOL 359	Evolution	3
BIOL 472	Structure and Diversity of Plants and Fungi	3
300-400 Elective: Select from the following:		3
BIOL 414	Plant Systematics	
BIOL 461	Plant Ecology	
BIOL 475	Conservation Biology	
PLSC 380	Principles of Plant Physiology	

Total Credits**17**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- *Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Botany minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.*

Botany

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/botany/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/botany/>)

The botany minor is the study of plants, including plant structure, function, systematics, and ecology. The courses required for this minor focus on the relationship of plants to each other and their environment, plant growth and metabolism, classification and identification of plants, plant cell composition and plant heredity.

Business Administration

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/business-administration/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/business-administration/>)

The global economy offers a vast array of career opportunities for professionals with a collegiate education in business. Businesses need individuals who not only understand the fundamentals of business practice, but who are adaptable in rapidly changing business environments. The business administration program has evolved to meet the needs of business firms and students by providing our students with a broad knowledge base in accounting, finance, management, marketing, entrepreneurship, management information systems, and business law – with a blend of theory and practice. A broad understanding of business is particularly of value for individuals who operate in entrepreneurial firms, smaller enterprises, and organizations that need flexibility and multi-functional knowledge from their employees. Individuals who aspire to own their businesses or go on to graduate studies (e.g., law school) would also benefit from such a broad business knowledge base. Our graduates of the business administration program gain employment in business and non-profit organizations, pursue their own businesses and graduate studies, and enhance their abilities to manage business operations, analyze business opportunities/challenges, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Business Administration major is a four-year program with a curricular blend of general education, pre-professional course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), international business, and business elective courses. The curriculum of this major is also designed with a 21-credit business elective block plus 3 credits of 300/400 level free electives built into the program. These electives allow students to pursue their personal or professional interest in certain business domains, which can be in the form of a specific track (e.g., Supply Chain Management), certificate/minor (e.g., Professional Selling and Sales, Entrepreneurship), and/or topic-based courses fitting the business knowledge/skills they want to develop. The program nurtures important business skills and administrative competencies including managing/overseeing business enterprises, ability to analyze business opportunities/challenges, legal and international awareness, interpersonal skills, and teamwork. Business Administration students are thus prepared to perform and manage various administrative and functional activities in business enterprises and non-profit organizations.

ONLINE OPTION

The Business Administration major is also available in an online delivery. For more information, see here (<https://www.ndsu.edu/business/programs/undergraduate/majors/online/>).

Selective Admission

Students who wish to study business administration at NDSU enroll as pre-business students in the College of Business for their first semester of their freshman year. Admission to the professional program requires the successful completion of the pre-professional course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.5. Transfer students may also be eligible for immediate admission in the professional program. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their business practice, challenges, and issues.

The Practicum

Business administration majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect business concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a business administration major have career opportunities in business, industry, government service and the non-profit sector, both regionally and globally. Employment opportunities for business administration majors are significant as business-related activities and administrative functions are needed in every type of business and organization, whether for-profit or not-for-profit. Major job categories include business operations, business analyst, human resource management, product/service management, retail management, small business owner, and entrepreneurship venture.

Minor in Business Administration

A minor in business administration can be a perfect choice for students with non-business majors who want to enhance their marketability through business knowledge and skills. The curricular details are available at <https://www.ndsu.edu/business/programs/>. This minor is not available to students with majors in the College of Business.

The College

In addition to the business administration major, the College of Business offers undergraduate majors in accounting, finance, global business (second major only), management, marketing and management information systems. The College of Business also offers six graduate programs including Master of Business Administration, Master of Accountancy, Master of Science in Business Analytics, Master of Managerial Logistics, Master of Transportation and Urban Systems, and Doctorate in Transportation and Logistics.

High School Preparation

It is recommended that high school students interested in studying business administration at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be of benefit. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the professional program. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
MATH 144		4 ENGL 120	3
PSYC 111		3 TL 116	3
ECON 201		3 ECON 202	3

Gen Ed Wellness		2 Non-major Elective		3
		15		15
Sophomore				
Fall	Credits	Spring	Credits	
ACCT 200		3 ACCT 201		3
PHIL 216		3 STAT 331		2
SOC 110		3 Gen Ed Humanities/Fine Arts		3
STAT 330		3 Gen Ed Science & Technology (w/ lab)		4
Gen Ed Science & Technology		3 Non-Major Elective		3
		15		15
Junior				
Fall	Credits	Spring	Credits	
ENGL 320		3 BUSN 430		3
FIN 320		3 MIS 320		3
MGMT 320		3 BUSN 340		3
MRKT 320		3 MGMT 470		3
Gen Ed Cultural Diversity		3 300-400 Level Business Elective (1 course) ¹		3
		15		15
Senior				
Fall	Credits	Spring	Credits	
BUSN 431		3 BUSN 489		3
300-400 Level Business Electives (3 courses) ¹		9 300-400 Level Business Electives (3 courses) ¹		9
Non-major Elective		3 300-400 Level Elective (1 course)		3
		15		15

Total Credits: 120

¹ These 21 credits must include at least three different CoB prefixes: BUSN, MGMT, MRKT, ACCT, FIN, MIS, ENTR (includes courses cross-listed with CoB courses). TL 360, TL 461, and TL 462 are eligible business administration electives.

Note:

- Business Administration majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business and free electives taken meet the track requirements.

Business Administration

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/business-administration/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/business-administration/#planofstudytext>)

Major Requirements

Major: Business Administration

Degree Type: B.S.

Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
All courses taken for the Business Administration Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300-400 level courses and to graduate.		
Admission to the Professional Program Requirements		
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C)	3
ECON 201 or ECON 202	Principles of Microeconomics (May satisfy general education category B and G) Principles of Macroeconomics	3
ENGL 120	College Composition II (May satisfy general education category C)	3
MATH 144	Mathematics for Business	4
PSYC 111 or SOC 110	Introduction to Psychology (May satisfy general education category B) Introduction to Sociology	3
Business Administration Major Requirements		

ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics (May satisfy general education category A)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
ECON 201	Principles of Microeconomics ¹	3
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology ¹	3
or SOC 110	Introduction to Sociology	
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
Admission to the Professional Program required prior to taking the following courses:		
FIN 320	Principles of Finance ²	3
MGMT 320	Foundations of Management ²	3
MRKT 320	Foundations of Marketing ²	3
MIS 320	Management Information Systems ²	3
BUSN 430	Legal and Social Environment of Business ²	3
BUSN 489	Strategic Management ²	3
BUSN 340	International Business	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
MGMT 470	Entrepreneurship/Small Business Management	3
Business Administration Electives (300 - 400 level)		21
These 21 credits must include at least three different CoB prefixes: BUSN, MGMT, MRKT, ACCT, FIN, MIS, ENTR (includes courses cross-listed with CoB courses). TL 320, TL 360, and TL 462 are eligible business administration electives.		
Business Administration Elective (300 - 400 level)		3
This 300 - 400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300 - 400 level course. It cannot be used to satisfy other requirements (includes courses cross-listed with CoB courses).		
Total Credits		93

¹ Take the second course of the pair, which was not taken for admission to the professional program.

² Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students follow the published curricula for the business administration program of study from the semester/year of entrance in the College of Business (CoB) to graduation, provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the CoB; such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with the approval of the department.
- Admission to the business administration major is required to enroll in advanced 300 or 400 level CoB courses.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Business Administration major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- For multiple majors within CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives.
- Student may choose to take the Supply Chain Management Track within the Business Administration major:

Code	Title	Credits
TL 320	Integrated Supply Chain Management	3
TL 462	Modeling the Supply Chain	3
Select two of the following:		6

TL 360	Operations Management
MGMT 451	Negotiation and Alternative Dispute Resolution
MRKT 430	Sales and Personal Selling
MRKT 438	Customer Relationship Management (CRM) and Sales Technology
MRKT 460	Marketing Strategy
AGEC 378	Introduction to Transportation & Logistics

Minor Requirements

Minor: Business Administration

Minimum Credits: 24

Minor Requirements

Code	Title	Credits
Requirements		
Select one of the following:		3
ACCT 102	Fundamentals of Accounting	
ACCT 200	Elements of Accounting I	
Select one of the following:		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Select two of the following:		6
FIN 320	Principles of Finance	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
Elective Courses ¹		12
BUSN 300-400 Level		
FIN 300-400 Level		
MGMT 300-400 Level		
MRKT 300-400 Level		
ENTR 300-400 Level		
MIS 320	Management Information Systems	
TL 320	Integrated Supply Chain Management	
TL 360	Operations Management	
TL 462	Modeling the Supply Chain	
May also include courses cross-listed with College of Business course at the 300-400 level		

Total Credits **24**

¹ The following courses are excluded from the 300-400 level electives: BUSN 413, and ENTR 496.

Minor Requirements and Notes

- This minor is not available to students with majors in the College of Business.
- To enroll in 300/400 level college of business courses, students must have 2.5 minimum institutional cumulative GPA.
- Departmental approval is required for any course (including Tri-College) NOT completed at NDSU and used to satisfy the minor requirements (6 credits maximum).
- Students must earn a 2.50 minimum GPA, which is based upon the courses used to satisfy the minor requirements. Minors must satisfy all course prerequisites.

Business Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life

- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/business-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/business-education/>)

Business education is a multi-disciplinary program that will prepare teacher candidates to be licensed as a business education teacher. The plan of study encompasses coursework from teacher education, business, computer sciences, and communication departments. The business education major includes a broad range of content and professional education courses so that teacher candidates fully understand (a) the discipline of business education, (b) current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

THE PROGRAM

Candidates in the business education major are prepared to teach students in grades 5-12 with creativity and confidence. Teacher candidates will gain knowledge and skills in business, management, marketing, accounting, computing, software development, web design, and database systems. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners.

PROFESSIONAL EDUCATION COURSES

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain at least a 2.75 grade point average in overall course work and education courses. Teacher candidates must also pass the Praxis Core Academic Skills for Educators exam or meeting minimum scores on the ACT+. Additional requirements for admission are available on the **School of Education website**.

STUDENT TEACHING

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced business teachers in middle or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate student teachers so that they gain the confidence and ability to join the teaching profession after graduation.

STUDENT ADVISEMENT

An academic advisor works individually with Business Education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

LICENSURE

Upon completing this program, teacher candidates are eligible for teacher licensure in Business education in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

CAREER OPPORTUNITIES

Business teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. In addition to teaching careers, business education graduates can choose to seek advanced degrees in business or obtain careers as corporate trainers, managers, entrepreneurs, or in business. Many options are available because a business education degree effectively teaches students to think critically, to synthesize information, to write and speak clearly and concisely, and to work effectively on teams.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 CSCI 114 or TL 116	3
COMM 110		3 CSCI 122	3
ACCT 102		3 ENGL 120	3
Humanities/Fine Arts (Gen. Ed. elective)		3 ECON 105	3
Wellness (Gen. Ed. elective)		2-3 Humanities/Fine Arts (Gen. Ed. elective)	3
14-15			15
Second Year			
Fall	Credits	Spring	Credits
CSCI 227		3 CSCI 228	3
ACCT 200		3 MGMT 320	3
MRKT 320		3 COMM 308	3
EDUC 321		3 EDUC 322	3
H&CE 232		3 Science and Technology w/lab (Gen. Ed. elective)	4
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
15			16
Third Year			
Fall	Credits	Spring	Credits
CSCI 312		3 MIS 320	3
BUSN 340		3 BUSN 430	3
MGMT 470		3 ENGL 320	3
COMM 260		3 COMM 261	3
EDUC 451		3 Business elective	3
		EDUC 489	3
15			18
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (Business Methods)		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
Business elective		3 EDUC 488	3
Social/Behavioral (Gen. Ed. elective)		3	
Science and Technology		3	
Apply to student teach			
Complete Subject Assessment exam (Praxis II)			
Complete Principles of Learning and Teaching exam (7-12)			
15			13
Total Credits: 121-122			

Business Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life Center 210
- **Department Phone:**
701-231-7921
- **Department Web Site:**
<https://www.ndsu.edu/education/>
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/business-education/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/business-education/>)

Major: Business Education

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
ACCT 200	Elements of Accounting I	3
BUSN 340	International Business	3
BUSN 430	Legal and Social Environment of Business	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
CSCI 122	Visual BASIC (May satisfy general education category R)	3
CSCI 213	Modern Software Development	3
CSCI 227	Computing Fundamentals I	3
CSCI 228	Computing Fundamentals II	3
CSCI 366	Database Systems	3
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
COMM 308	Business and Professional Speaking	3
ECON 105	Elements of Economics (May satisfy general education category B & G)	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
H&CE 232	Philosophy and Policy	3
MRKT 320	Foundations of Marketing	3
MGMT 320	Foundations of Management	3
MGMT 470	Entrepreneurship/Small Business Management	3
Elective Business Administration Minor - choose one course from:		3
MRKT 410	Consumer Behavior	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 465	Digital Marketing	
MGMT 330	Foundations of Organizational Behavior	
MGMT 430	Leadership in Organizations	
MGMT 451	Negotiation and Alternative Dispute Resolution	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 472	Managing Family Enterprises	
Additional 300-400 Business Elective - choose one course from:		3
MRKT 410	Consumer Behavior	
MRKT 420	Advertising and Integrated Marketing Communication	
MRKT 465	Digital Marketing	
MGMT 330	Foundations of Organizational Behavior	
MGMT 430	Leadership in Organizations	
MGMT 451	Negotiation and Alternative Dispute Resolution	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 472	Managing Family Enterprises	
Teaching Specialty Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I:	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		94

Degree Notes:

- This degree plan will allow students to earn a Business Administration minor by completing the following courses totaling 24 credits: ACCT 102, ECON 105, MRKT 320, MGMT 320, MGMT 470, BUSN 340, BUSN 430, BUSN Elective. This minor requires a minimum GPA of 2.5 in the courses that make up the minor. Students must officially declare this minor through the Office of Registration and Records to ensure the credential is posted to record.

Chemistry

Department Information

- **Department Location:**
Ladd Hall
- **Department Phone:**
701-231-8694
- **Department Email:**
ndsu.chemistry@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry/>)

The chemistry undergraduate major and its specialized options at North Dakota State University provides opportunities for personal achievement and professional training that are typically not available at many universities. Faculty teach all major courses. Students use state-of-the-art instrumentation in their laboratory courses. Many students get involved in fundamental and applied research with faculty research groups and have growth experiences commonly available only to graduate students. Future secondary chemistry and science teachers can participate in supervised laboratory teaching and peer mentoring programs.

Background Information

Industry and graduate schools are well aware of the quality of the undergraduate education at NDSU and actively seek out our graduates. Scholarships, fellowships and employment in research groups or in supervised teaching activities can cut the already modest cost of an NDSU education by one-half or more.

The Program

The Department of Chemistry and Biochemistry is fully accredited by the American Chemical Society (ACS) and offers programs leading to an ACS-certified Bachelor of Science degree. Options in biochemistry or coatings and polymeric materials can be added to the curriculum. A pre-professional option for those planning on medical, dental and other professional schools is also available. A chemistry major may be combined with secondary school teacher certification with as little as one additional semester for student teaching.

The prescribed curriculum provides a solid grounding through classroom and laboratory work in all of the main areas of chemistry. Major laboratory courses are designed to utilize the latest synthesis and characterization methods and employ advanced, computer-interfaced instrumentation.

Our pre-professional option includes the course work in biological and biochemical sciences that easily meets the requirements of medical, dental and other health-related professional schools. A chemistry major offers rigorous pre-professional education, as well as a back-up option in case career plans change in the future.

Research Opportunities

Almost every chemistry faculty member is heavily involved in forefront research, and undergraduates are encouraged to participate in that research. Students gain important skills and are exposed to the excitement of the hunt for new knowledge. This research experience often helps students define career goals more sharply.

Career Opportunities

People often think of the professional chemist as one who stands at a workbench in an industrial laboratory carefully manipulating chemicals or instruments. A lot of chemists are employed this way. This is often quite satisfying since many people are drawn to chemistry because they enjoy laboratory work. There are, however, many other tasks besides laboratory research in which a chemist may engage, and many different careers for which he or she can prepare for a degree in chemistry. A chemist may be employed in government, business, industry or education. Besides basic and applied research (the lab bench), an industrial chemist may be involved in production, technical service (assisting people who use products), national and international marketing and sales, or management and corporate planning. Some chemists prefer self-employment through small business or consulting firms.

Analytical chemists are in demand for services to other departments within a chemical company, for quality control in large and small concerns, and for environmental monitoring by industrial, governmental and private organizations. Organic chemists, also in great demand, study new pharmaceuticals, polymers and other compounds. Materials chemists are needed by all high-tech industries for their synthesis and characterization skills. Inorganic chemists work on the full range of synthesis, characterization and application of chemical compounds. Physical chemists model chemical structures and reactions, and design experiments and equipment to study them. The Department of Chemistry and Biochemistry offers specialized education and training in each of these fields.

A degree in chemistry can serve as excellent preparation for careers in medicine, dentistry and other health professions. A chemistry degree also can lead to law school, and perhaps a career in patent law, a very demanding and in-demand technical profession. About half of NDSU's chemistry graduates go on to graduate or professional schools. Almost all the rest go directly into industry. Average entry-level salaries for chemistry graduates is \$45,300 to \$81,400, based on 2016 data from www.payscale.com (<http://www.payscale.com>). For chemists who have advanced degrees, salary and opportunities are often much greater.

Faculty and Facilities

The Department of Chemistry and Biochemistry has 17 faculty members. All of the faculty have doctorate degrees from leading universities.

The Department of Chemistry and Biochemistry's teaching and research facilities are located in two connected buildings—Ladd and Dunbar Halls. Some additional laboratories are located in the A. Glenn Hill Center, and Quentin Burdick Building. Students are trained in the use of state-of-the-art equipment, some of which is duplicated at only a few sites in the world. Some undergraduate students are trained to use several powerful and sophisticated laser systems, and some have even built lasers that were put directly to work on research projects. Nuclear magnetic resonance spectrometry, X-ray diffraction and fluorescence are as up-to-date as one would expect to find at any major research university. Theoretical chemistry researchers use some of the most powerful computers on the NDSU campus.

High School Preparation

Ideal high school preparation for a chemistry major includes four years each of English and mathematics, and a year each of biology, chemistry and physics. Experience with personal computers is also desirable. Strong writing and communication skills are as important to success in chemistry as they are in any technical field.

Financial Support

A number of endowed scholarships and fellowships are available to highly qualified applicants. The Department of Coatings and Polymeric Materials offers industry-funded scholarships and fellowships to chemistry majors interested in taking the coatings and polymeric materials option. In addition, more than half of the students majoring in chemistry are engaged in research and earning substantial portions of their living expenses. Financial support for research experiences is provided principally by grants and contracts of faculty researchers, various summer Research Experiences for Undergraduates (SURE) programs, and national scholarship and fellowship programs, such as the Goldwater Foundation. Since 1992, nine students in the department have been awarded Goldwater Fellowships, which cover all educational expenses. Students interested in secondary school teaching have additional funding opportunities as laboratory teaching assistants and discussion leaders in a peer-tutoring program known as Supplemental Instruction. These positions not only provide an opportunity for help toward meeting expenses but also in adding relevant experience to resumes.

Sample Program Guide

B.S. Chemistry, ACS Certified

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
CHEM 150 & CHEM 160		4 COMM 110	3
MATH 165		4 CHEM 151 & CHEM 161	4
BIOL 150		3 MATH 166	4
Gen Ed Social & Behavioral Sci and Cultural Diversity		3 Gen Ed Humanities and Fine Arts	3

Second Year			
Fall	Credits	Spring	Credits
CHEM 341		3 CHEM 342	3
CHEM 353		1 CHEM 354	2
MATH 128		1 MATH 266	3
MATH 259		3 PHYS 252 & 252L	5
PHYS 251 & 251L		5 Gen Ed Wellness	2
Gen Ed Humanities & Fine Arts and Global Perspectives		3	
		16	15
Third Year			
Fall	Credits	Spring	Credits
CHEM 431 & 431L		5 CHEM 365	3
CHEM 364		3 CHEM 380	1
CHEM 471		2 Electives	9
ENGL 324		3	
Gen Ed Social and Behavioral Sci		3	
		16	13
Fourth Year			
Fall	Credits	Spring	Credits
BIOC 460 & 460L		4 CHEM 425	3
CHEM 432 & 432L		4 CHEM 429	2
Electives		6 CHEM 491	2
		Electives	6
		14	13
Total Credits: 121			

Chemistry

Department Information

- **Department Location:**
Ladd Hall
- **Department Phone:**
701-231-8694
- **Department Email:**
ndsu.chemistry@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/chemistry/#planofstudytext>)

Major Requirements

Major: Chemistry

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. [*]		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences [*]		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFs, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Code	Title	Credits
Chemistry Core Requirements		
Select one from the following (May satisfy general education category R):		4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
Select one from the following (May satisfy general education category S):		4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341	Organic Chemistry I	3
CHEM 342	Organic Chemistry II	3
CHEM 353	Majors Organic Chemistry Laboratory I	1
CHEM 354	Majors Organic Chemistry Laboratory II	2
CHEM 364	Physical Chemistry I	3
CHEM 365	Physical Chemistry II	3
CHEM 380	Chemistry Junior Seminar	1
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 471	Physical Chemistry Laboratory (Not required for Pre-professional and Chemistry Education Options)	2
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
CHEM 491	Seminar	2
Related Required Courses		
ENGL 321 or ENGL 324	Writing in the Technical Professions (May satisfy general education category C) Writing in the Sciences	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Option	Select one of the five options listed below to complete the major.	12-32
Total Credits		74-94

Select one of the five options to complete major requirements (12-32 credits):

Option 1: ACS Certified Chemistry

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
MATH 266	Introduction to Differential Equations	3
Total Credits		12

Option 2: ACS Certified w/Biochemistry Option

Code	Title	Credits
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 473	Methods of Biochemical Research	3
BIOC 474	Methods of Recombinant DNA Technology	3

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
MATH 266	Introduction to Differential Equations	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select 6 credits of the following (Biology):		6
BIOL 315 & 315L	Genetics and Genetics Laboratory	
BOT 380	Plant Physiology	
MICR 352	General Microbiology II	
ZOO 370	Cell Biology	

Total Credits **32**

Option 3: Coating & Polymeric Materials

Code	Title	Credits
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	5
CHEM 471	Physical Chemistry Laboratory	2
CHEM 432 & 432L	Analytical Chemistry II and Analytical Chemistry II Laboratory	4
CPM 473	Polymer Synthesis	3
CPM 474 & CPM 484	Applied Polymer Science and Coatings I Laboratory	5
CPM 475 & CPM 485	Coatings' Materials Science and Coatings II Laboratory	5
MATH 266	Introduction to Differential Equations	3

Total Credits **27**

Option 4: Pre-Professional Option

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 425	Inorganic Chemistry I	3
MATH 266 or STAT 330	Introduction to Differential Equations Introductory Statistics	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5

Total Credits **23**

Option 5: Chemistry Pre-Education Application must be made to the School of Education in order to obtain a teaching degree

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 425	Inorganic Chemistry I	3
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
MATH 266 or STAT 330	Introduction to Differential Equations Introductory Statistics	3
PHYS Elective		3

Recommended for Education Option

BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
Total Credits		27

Minor Requirements

Minor: Chemistry

Required Credits: 19

Minor Requirements

Code	Title	Credits
Required Courses		
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
CHEM 122L	General Chemistry II Laboratory	1
Electives		11
300-400 level courses in chemistry, biochemistry, or coatings & polymeric materials; one lab course required.		
Total Credits		19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Chemistry Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/chemistry-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/chemistry-education/#planofstudytext>)

Major Requirements

Major: Chemistry Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 136

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
Pick an introductory chemistry sequence		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 425	Inorganic Chemistry I	3
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 465	Survey of Physical Chemistry	4

ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Pick one of the following:		4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category S and G)	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab (May satisfy general education category S and G)	
Pick one of the following sequences:		8-12
Sequence A:		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
Sequence B:		
PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	
PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		100-104

Degree Requirements and Notes

- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Chemistry Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/chemistry-education/>)

Chemistry involves the study of the composition, structure, properties and interactions of matter. Chemistry is often considered a central or enabling science, because it is foundational to understanding other scientific disciplines. Teaching chemistry in middle and secondary schools requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in secondary instruction. Accordingly, the chemistry education major combines coursework in chemistry and related sciences with professional education courses on teaching and learning.

The Program

Candidates in chemistry education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; pass the Praxis Core Academic Skills test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced classroom teachers in middle or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Chemistry education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in most states. Teacher candidates who take the Praxis Subject Assessment exam for Chemistry will be licensed to teach Chemistry and related high school courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education and Standards Practices Board (ESPB).

Career OPPORTUNITIES

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 124 & BIOL 100L		4 CHEM 122 or 151 (Must be matching lab with lecture)	3
CHEM 121 or 150 (Must be matching lab with lecture)		3 CHEM 122L or 161 (Must be matching lab with lecture)	1
CHEM 121L or 160		1 COMM 110	3
ENGL 110 (or 120 College Composition II based on placement)		3 ENGL 120	3

GEOL 105 & 105L		4 GEOL 106 & 106L	4
Humanities & Fine Arts Gen Ed*			3
15			17
Second Year			
Fall	Credits	Spring	Credits
CHEM 341 & 341L		4 CHEM 342 & 342L	4
EDUC 321		3 EDUC 322	3
MATH 165		4 MATH 166	4
PHYS 211 & 211L		4 PHYS 212 & 212L	4
Wellness Gen Ed		2 Apply to the School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
17			15
Third Year			
Fall	Credits	Spring	Credits
BIOL 150 & 150L		4 BIOC 260	4
CHEM 465		4 CHEM 425	3
EDUC 451		3 EDUC 481	3
Social & Behavioral Science Gen Ed*		3 EDUC 486	3
Humanities & Fine Arts Gen Ed*		3 Social & Behavioral Science Gen Ed*	3
17			16
Fourth Year			
Fall	Credits	Spring	Credits
CHEM 431 & 431L		5 EDUC 485	1
EDUC 482		3 EDUC 487	9
EDUC 489		3 EDUC 488	3
ENGL 324		3	
STAT 330		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
17			13
Total Credits: 127			

* One of these General Education courses needs to be selected from Category D - Cultural Diversity.

Civil Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering 201
- **Department Phone:**
701-231-7244

- **Department Web Site:**

www.ndsu.edu/cee/ (<http://www.ndsu.edu/cee/>)

- **Credential Offered:**

B.S.C.E.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/civil-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/civil-engineering/>)

Would you like to make this world a better place to live, and improve the quality of life for all of us? You could do just that by choosing a career in civil engineering. We design sustainable solutions to societal challenges today and into the future.

Civil engineers play an enviable role in enhancing the quality of life and positively impacting the everyday life of people everywhere. We design solutions for the infrastructure of society and the environment in which we live. Civil engineering projects may include designing structures such as buildings, bridges and sports stadiums; transportation infrastructure such as highways, railroads, pipelines, waterways, ports and airports; water infrastructure like pipes, dams and drainage; safe drinking water supply and waste systems; and averting damage from earthquakes, landslides and floods. The profession embraces new technologies such as nanotechnology, smart materials, sensors, robotics, etc. that are introduced into civil engineering projects to improve reliability, cost effectiveness and quality of life.

The Program

Civil engineers are professionals who have broad technical knowledge, possess strong problem solving skills and enjoy working with people. Our work is directly related to the public wellbeing and safety, and has a significant impact on decision making and planning processes.

The graduates from North Dakota State University's Department of Civil and Environmental Engineering apply their skills in all fields of the profession domestically and abroad. NDSU civil engineering graduates are highly sought by companies from all over the country at competitive salaries. They have most certainly put their education to good use, bettering themselves and the world in which they live. The department offers the B.S., M.S. and Ph.D. degrees in Civil Engineering, B.S. and M.S. degree in Environmental Engineering, and participates in interdisciplinary graduate programs such as Ph.D. degree in Materials and Nanotechnology, M.S. and Ph.D. degrees in Environmental Conservation Sciences, Ph.D. degree in Transportation and Logistics, and M.S. and Ph.D. degrees in Biomedical Engineering. A 4+1 accelerated master degree in Civil Engineering is planned to begin in Fall 2021.

Mission

The mission of the Department of Civil and Environmental Engineering is to:

1. Provide quality education to prepare nationally competitive undergraduate students for a successful career in civil and environmental engineering;
2. Provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of civil and environmental engineering for graduate students; and
3. Provide service to the university, engineering profession and the public.

Program Educational Objectives

The following program educational objectives are consistent with the university, college and department missions. Graduates of our B.S. in Civil Engineering program are expected within a few years of graduation to:

1. Engage successfully in the practice of engineering to solve current and emerging problems.
2. Conduct design in a manner that is ethical, includes diverse perspectives, and realizes the broader societal and sustainability implications of the design and decision-making process.
3. Ascend to leadership roles within the workplace via initiative and responsible stewardship
4. Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service.

A Flexible Curriculum

First year civil engineering students at NDSU begin their education with fundamental courses in English, chemistry, math and an introduction to the engineering sciences. Second year courses become more specific with an emphasis in surveying, math, physics and engineering science courses. The third year students preview the specialization areas of civil engineering. These are (1) geotechnical, (2) structural, (3) transportation, (4) water resources and (5) environmental engineering. The senior year continues to require certain courses but also provides for 12 hours of technical electives and a senior design project. The technical electives allow the student to take additional courses in those areas of civil engineering in which he or she intends to practice professionally. Currently, there are 42 civil engineering courses from which the student may choose.

Faculty

The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. All classes are taught/assessed by full-time professors, and supplemented by lectures from leaders in industry.

Modern, Well-Equipped Facilities

The department has excellent laboratory facilities for undergraduate education and research, including the new undergraduate laboratories for water resources and environmental engineering, laboratories for geotechnical engineering, structural engineering and civil engineering materials, and several state-of-the-art research laboratories.

Student Organizations

Students participate in several professional student organizations in the department, which helps them develop leadership skills and the ability to work in teams. The NDSU American Society of Civil Engineers (ASCE) Steel Bridge Team has won six national championships, more than any school in the country. The NDSU American Water Works Association (AWWA) and the Water Environment Federation (WEF) student chapter has won 2 national design competitions and a number of regional and state competitions. Other organizations have also won national and regional awards.

Preparation

High school students who wish to prepare for some phase of engineering at the college level should attempt to complete the following high school credits: one unit of physics, four units of mathematics, and one unit of chemistry. Incoming freshmen prepared to enroll in calculus frequently complete their civil engineering degree in four years. Students who have studied two years of pre-engineering at another institution typically complete the civil engineering degree in two additional years.

Scholarships and Financial Aid

The Department of Civil and Environmental Engineering awards Solien, Vernon L. and Ruth Scholarship Endowment, Dr. Edwin Wetterstrom Scholarship, Moore Engineering Inc. Scholarship Endowment, Nelson, Donald Memorial Scholarship, Traynor, Duane Civil Engineering Scholarship, and many other scholarships. The scholarship awards range from \$500 to \$10,000. The Institute of Transportation Engineers (ITE) and ASCE student chapters recognize students who are active in their respective organizations. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

Career Opportunities

NDSU civil engineers are widely regarded as hands-on, can-do, project-ready graduates, who are very successful in finding excellent jobs. Our students are highly sought for internships and co-ops, with most students having completed multiple work experiences. Most have selected a job before graduation and others within a few weeks of graduation. The work varies in regard to type of activity and location. Civil engineers can work in the office, in the field or a combination of the two. They can work primarily with a number of intricate designs or with people in management or sales.

Job placement of recent NDSU civil engineering graduates indicates a variety of work experience. About 40 percent of the graduates have gone to work for consulting engineering firms and another 40 percent with city, state and federal government. The remainder are employed by industry, contractors and the military or have gone to graduate school at NDSU or other universities. Most graduates are involved in more than one type of civil engineering activity. Some students accept jobs in which they are not involved in a specific civil engineering activity, but use their engineering background in other activities. Job placement of graduates seeking employment is 98-100 percent in recent semesters. The starting annual salaries accepted by recent civil engineering graduates were between \$53,000 and \$75,000 (average salary around \$60-65,000).

Graduate programs leading to Master of Science and Doctor of Philosophy degrees are available in specialized fields. For more complete details, see the [Graduate Bulletin \(p. 733\)](#) online.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CE 111		1 CE 112	1
CHEM 121		3 CHEM 122	3
CHEM 121L		1 CHEM 122L	1
ENGL 110 (or placement)		3 COMM 110	3
ENGL 120		3 MATH 166	4
MATH 165		4 ME 221	3

GEN ED HUMANITIES CATEGORY
"A" 3

15 18

Sophomore

Fall	Credits	Spring	Credits
CE 204		3 IME 460	3
CE 212		3 MATH 266	3
GEOL 105		3 ME 223	3
MATH 128 (129)		1 PHYS 252	4
MATH 259 (265)		3 GEN ED WELLNESS CATEGORY "W"	2
ME 222		3	

16 15

Junior

Fall	Credits	Spring	Credits
CE 309		3 CE 303	2
CE 316		3 CE 303L	1
ENGL 321		3 CE 343	4
ENGR 402		1 CE 370	3
ME 350		3 CE 371	1
ENGR 311 (FULFILLS GEN ED CATEGORY "A")		3 CE 408	3
		CE 418	4

16 18

Senior

Fall	Credits	Spring	Credits
CE 310		1 CE 483	3
CE 404		3 CE 489	3
CE 444		3 IME 440	2
ENGR 312 (FULFILLS GEN ED CATEGORY "B")		3 Technical Elective	3
GEN ED SOCIAL SCIENCES CATEGORY "B"		3 Technical Elective	3
Technical Elective		2 Technical Elective	2
Technical Elective		2	

17 16

Total Credits: 131

Civil Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering
- **Department Phone:**
701-231-7244
- **Department Web Site:**
www.ndsu.edu/cee/ (<http://www.ndsu.edu/cee/>)
- **Credential Offered:**
B.S.C.E.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/civil-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/civil-engineering/#planofstudytext>)

Major Requirements

Major: Civil Engineering

Degree Type: B.S.C.E.

Minimum Credits Required for Degree: 132

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Civil Engineering Core Requirements		
CE 111	Introduction to Civil Engineering	1
CE 112	Computer Applications in Civil Engineering	1
CE 204	Surveying	3
CE 212	Civil Engineering Graphic Communications	3
CE 303	Civil Engineering Materials	2
CE 303L	Civil Engineering Materials Laboratory	1
CE 309	Fluid Mechanics	3

CE 310	Fluid Mechanics Laboratory	1
CE 316	Soil Mechanics	3
CE 343	Structural Engineering and Analysis	4
CE 370	Introduction to Environmental Engineering	3
CE 371	Environmental Engineering Laboratory	1
CE 404	Reinforced Concrete	3
CE 408	Water Resources and Supply	3
CE 418	Transportation Engineering	4
CE 444	Structural Steel Design	3
CE 483	Contracts and Specifications	3
CE 489	Senior Design	3
MATH Courses Required: ¹		
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses :		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
ENGR 402	Engineering Ethics and Social Responsibility	1
ENGR 311	History of Technology in America (May satisfy general education category A)	3
ENGR 312	Impact of Technology on Society (May satisfy general education category B)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
GEOL 105	Physical Geology (May satisfy general education category S and G)	3
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
ME 221	Engineering Mechanics I ¹	3
ME 222	Engineering Mechanics II ¹	3
ME 223	Mechanics of Materials ¹	3
ME 350	Thermodynamics and Heat Transfer ²	3
PHYS 252	University Physics II	4
Technical Electives Required: Select 12 credits from the following:		12
Structures:		
CE 411	Design of Pre-stressed Concrete (Design Credits 1.0)	
CE 425	Bridge Evaluation and Rehabilitation (Design Credits 1.5)	
CE 430	Timber and Form Design (Design Credits 1.5)	
CE 441	Finite Element Analysis (Design Credits 1.0)	
CE 445	Advanced Steel Design (Design Credits 1.0)	
CE 446	Basic Dynamics of Structures (Design Credits 1.0)	
CE 447	Stability of Structures (Design Credits 1.5)	
CM&E 465	Bridge Engineering and Management (Design Credits 1.5)	
Water Resources:		
CE 421	Open Channel Flow (Design Credits 1.5)	
CE 474	Groundwater Sustainability Design (Design Credits 1.5)	
CE 476	Watershed Modeling (Design Credits 1.5)	
CE 477	Applied Hydrology (Design Credits 1.5)	
Environmental:		
CE 410	Water and Wastewater Engineering (Design Credits 1.5)	
CE 471	Environmental Nanotechnology (Design Credits 1.5)	

CE 472	Solid Waste Management (Design Credits 1.0)
CE 473	Air Pollution (Design Credits 1.5)
CE 478	Water Quality Management (Design Credits 1.5)
CE 479	Advanced Water and Wastewater Treatment (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.5)
Transportation:	
CE 419	Pavement Design (Design Credits 1.5)
CE 454	Geometric Highway Design (Design Credits 2.0)
CE 455	Airport Planning and Design (Design Credits 1.0)
CE 456	Railroad Planning and Design (Design Credits 1.5)
CE 457	Pavement Management Systems (Design Credits 1.0)
CE 458	Bituminous Materials and Mix (Design Credits 1.5)
CE 499	Special Topics (Design Credits 1.0)
Geotechnical:	
CE 417	Slope Stability and Retaining Walls (Design Credits 1.5)
CE 461	Foundation Engineering (Design Credits 1.5)
CE 462	Designing with Geosynthetics (Design Credits 1.0)
CE 463	Geotechnical Earthquake Engineering (Design Credits 1.5)
CE 464	Advanced Soil Mechanics (Design Credits 1.0)
Advanced Materials:	
CE 486	Nanotechnology and Nanomaterials (Design Credits 0.0)
CE 491	Seminar
CE 493	Undergraduate Research

Total Credits**114**

- ¹ No grades less than a "C" are accepted in any of the math courses, as well as ME 221 Engineering Mechanics I, ME 222 Engineering Mechanics II, and ME 223 Mechanics of Materials for this curriculum.
- ² Use ME 351 as an alternate when ME 350 is not available for students due to scheduling.

Degree Requirements and Notes

- **Students must complete courses in a minimum of three technical areas with a minimum of 6 credits in design for a minimum total of 12 technical electives.**
- Transfer students are required to take ENGR 311 History of Technology in America or ENGR 312 Impact of Technology on Society regardless of General Education completion.

Note: Department permission required for graduate level courses. Credit may be earned only at the undergraduate level. Department permission is also required for some undergraduate courses. There are specific prerequisites and grade requirements to be allowed to take certain courses.

Coatings and Polymeric Materials

Department Information

- **Department Location:**
Research 1
- **Department Phone:**
701-231-7633
- **Department Web Site:**
www.ndsu.edu/cpm/ (<http://www.ndsu.edu/cpm/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/coatings-polymeric-materials/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/coatings-polymeric-materials/>)

Everybody uses products that are painted or coated in everyday life, but often take coatings for granted. However, a \$100 billion industry exists to supply paints and coatings worldwide that decorate, protect and provide function to automobiles, building, furniture, aircraft, ships, appliances, bridges, medical devices, electronic devices and countless other objects. The performance of these coatings depends critically on specially tailored

polymers, which form coating films. Thus, coatings scientists must also be good polymer scientists. Other scientific disciplines are also important to the coatings scientist, such as organic chemistry, electrochemistry, rheology, surface chemistry, chemical analysis, photochemistry, mathematics, physics and several branches of engineering and materials science.

North Dakota State University started offering polymer and coatings chemistry courses in 1905. Of the few universities offering training that focuses on the technology of paints and coatings, NDSU has the longest and most extensive experience. Over the decades, the Department of Coatings and Polymeric Materials has established a worldwide reputation for education and research. Today, there is a high demand for coatings and polymer scientists at all degree levels, providing coatings and polymer materials graduates with abundant job opportunities. NDSU graduates are especially sought after by companies in the paint, coatings, and polymer industries. Graduates of the program are employed by major paint, coatings, polymer, and chemical companies with many graduates attaining upper management positions. At the undergraduate level, Bachelor of Science degrees in science and engineering with a coatings and polymeric materials minor are offered. Master's and doctoral degrees are available at the graduate level. A 4+1 accelerated B.S./M.S degree program is also available.

Coatings and Polymeric Materials

Department Information

- **Department Location:**
Research 1
- **Department Phone:**
701-231-7633
- **Department Web Site:**
www.ndsu.edu/cpm/ (<http://www.ndsu.edu/cpm/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/>)

Minor Requirements

Minor: Coatings & Polymeric Materials

Required Credits: 16

Code	Title	Credits
Required Courses:		
CPM 475	Coatings' Materials Science	3
CPM 474	Applied Polymer Science	3
Select one lab course from the following:		1-2
CPM 483	Polymer Practicum	
CPM 484	Coatings I Laboratory	
CPM 485	Coatings II Laboratory	
CPM 487	Corrosion and Materials Laboratory	
Elective Courses: Select 9 credits from the following (if CPM 487 was completed, select 8 credits)		9
CHEM 240	Survey of Organic Chemistry ^{2†}	
CHEM 341	Organic Chemistry I ^{1†}	
CHEM 341L	Organic Chemistry I Laboratory ^{1*}	
CHEM 342	Organic Chemistry II ^{1†}	
CHEM 342L	Organic Chemistry II Laboratory ^{1*}	
CPM 436	Biopolymers and Biocomposites	
CPM 451	Laboratory, Chemical, Radiation, and Biological Safety	
CPM 472	Environment and Chemical Industries	
CPM 473	Polymer Synthesis ³	
CPM 483	Polymer Practicum	
CPM 484	Coatings I Laboratory	
CPM 485	Coatings II Laboratory	
CPM 486	Corrosion and Materials	

CPM 487	Corrosion and Materials Laboratory	
Total Credits		16-17
¹	If CHEM 341 & 341L and CHEM 342 & CHEM 342L are required for a student's major program of study, these credits cannot count toward the CPM minor.	
²	If CHEM 240 is required for the student's major degree, the credits cannot also count for the CPM minor.	
³	Chemistry and Biochemistry & Molecular Biology majors are required to have CPM 473.	
*	CHEM 353 & CHEM 354 can be substituted for CHEM 341L & CHEM 342L.	
†	For the CPM minor a student cannot get credit for both CHEM 240 and CHEM 341/342.	

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.

Community Development

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/community-development/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/community-development/>)

Minor Requirements

Minor: Community Development

Required Credits: 18

Minor Requirements

Code	Title	Credits
Required Courses		
SOC 405	Community Development	3
EMGT 410	Comprehensive Emergency Management Planning	3
Economic Electives: Select at least one course from the following:		3
AGEC 220	World Agricultural Development	
AGEC 350	Agrisales	
AGEC/BUSN 347	Principles of Real Estate	
AGEC/BUSN 474	Cooperatives	
ECON 341	Intermediate Microeconomics	
ECON 461	Economic Development	
ECON 470	Public Economics	
ECON 472	International Trade	
ECON 481	Natural Resource Economics	
Business Administration Electives: Select at least one course from the following:		3
ACCT 102	Fundamentals of Accounting	
ACCT 200	Elements of Accounting I	
ACCT 201	Elements of Accounting II	
BUSN 430	Legal and Social Environment of Business	
BUSN 431	Business Law I-Contracts, Property and Torts	

BUSN 432	Business Law II-Business Organization and Commercial Transactions	
BUSN 487	Managerial Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 430	Management of Financial Institutions	
MGMT 301	Management for Non-Business Majors	
MGMT 430	Leadership in Organizations	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 470	Entrepreneurship/Small Business Management	
MGMT 471	Leading the Nonprofit Organization	
MRKT 301	Marketing for Non-Business Majors	
MRKT 450	Marketing Research	
Social Science Electives: Select at least one course from the following:		3
COMM 200	Introduction to Media Writing	
COMM 472	Public Relations Campaigns	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 264	Disaster Recovery	
EMGT 461	Business Continuity and Crisis Management	
GEOG 455	Introduction to Geographic Information Systems	
POLS 360	Principles of Public Administration	
SOC 431	Environmental Sociology	
SOC 439	Social Change	
SOC 465	Applied Demographics	
SOC/BUSN/ECON 196	Field Experience (or 296, 396, 496; no more than 3 credits)	
SOC/BUSN/ECON 199	Special Topics (or 299, 399, 499; no more than 3 credits)	
Select one additional course from the above categories		3
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Community Development

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/community-development/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/community-development/>)

The Community Development minor is an applied, multidisciplinary minor. The purpose of the minor is to prepare students to integrate community development concepts into their own occupations; to recognize the relationships of social, economic, and development change on community viability and sustainability; and to take a more active role in the affairs of their own communities. The minor consists of 18 credits. Requirements include EMGT 410 Comprehensive Emergency Management Planning and SOC 405 Community Development and a minimum of three credits in each of the following areas: economics, business, and social science.

Comprehensive Science Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/comprehensive-science-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/comprehensive-science-education/>)

The comprehensive science education degree requires coursework in biological sciences, chemistry, physics and earth science, as well as mathematics. Teaching science in middle and secondary school requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in middle and secondary instruction. Accordingly, the comprehensive science education major combines coursework in related sciences with professional education courses on teaching and learning.

The Program

Teacher candidates in comprehensive science education are prepared to teach students grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills test or meet minimum scores on the ACT+ Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teacher preparation program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced classroom teachers in middle or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate student teachers so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Comprehensive science education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

licensure

Upon completing this program, teacher candidates are eligible for teacher licensure to teach all content areas of science in North Dakota. Teacher candidates interested in licensure to teach in other states should consult with their academic advisor because comprehensive science is not a typical teacher licensure category in all states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 150 & 150L		4 BIOL 151 & 151L	4
ENGL 110		3 COMM 110	3
GEOL 105 & 105L		4 ENGL 120	3
MATH 105		3 GEOL 106 & 106L (Global Perspectives Gen Ed Requirement)	4
Wellness Gen Ed		2 Social & Behavioral Science Ed*	3
		16	17
Second Year			
Fall	Credits	Spring	Credits
BIOL 315 & 315L		4 BIOL 252	3
CHEM 121 & 121L		4 BIOL 364	3
EDUC 321		3 CHEM 122 & 122L	4
MICR 202 & 202L		3 EDUC 322	3
Humanities & Fine Arts Gen Ed*		3 Social & Behavioral Science Gen Ed	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		17	16
Third Year			
Fall	Credits	Spring	Credits
BIOL 364		3 EDUC 481	3
CHEM 341 & 341L		4 EDUC 486	3
EDUC 451		3 PHYS 212 & 212L	4
PHYS 110		3 SOIL 217	3
PHYS 211 & 211L		4 STAT 330	3
		17	16
Fourth Year			
Fall	Credits	Spring	Credits
BIOL 359		3 EDUC 485	1
EDUC 482		3 EDUC 487	9
EDUC 489		3 EDUC 488	3
ENGL 324		3	
Humanities & Fine Arts Gen Ed		3	

Apply for Student Teaching		
Complete PLT (grades 7-12) Exam		
Complete Subject Area Assessment Exam		
	15	13

Total Credits: 127

* One of these General Education courses needs to be selected from Category D - Cultural Diversity.

Comprehensive Science Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/comprehensive-science-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/comprehensive-science-education/#planofstudytext>)

Major Requirements

Major: Comprehensive Science Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6

Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Comprehensive Science Education Requirements		
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
Teaching Specialty Requirements		
Primary Concentration - Select one primary concentration from biology, chemistry, earth science, physics. Concentrations listed below.		24-25
Secondary Concentration - Two secondary concentrations from the science area not selected for the primary concentration.		24-28
Tertiary Concentration - One tertiary concentration from the science area not selected for the primary or secondary areas.		8
Math Requirements		
Select the math requirement based on choice of primary concentration. See math requirement section below.		6-18
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I:	2-3
EDUC 482	Classroom Practice/Methods of Teaching II:	2-3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		97-116

Code	Title	Credits
Primary Concentration		
Select one primary concentration from biology, chemistry, earth science, or physics.		
Biology (24 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL 359	Evolution	3
BIOL 364	General Ecology	3
BIOL 370	Cell Biology	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Chemistry (25 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	5
BIOC 260	Elements of Biochemistry	4
Earth Science (25 credits)		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
GEOL 350	Invertebrate Paleontology	3
GEOL 303	Paleontology Field Course	1
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
PHYS 110	Introductory Astronomy	3
SOIL 217	Introduction to Meteorology & Climatology	3
Physics (24 credits)		
PHYS 171	Introductory Projects in Physics	1
PHYS 215	Research For Undergraduates	1-3
PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	6
PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	6
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 361	Electromagnetic Theory	3
Code	Title	Credits
Secondary Concentration		
Select two secondary concentrations not selected as the primary.		
Biology (14 credits)		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 315	Genetics	3
BIOL 359	Evolution	3
Chemistry (12 credits)		
Select one introductory chemistry sequence (A or B)		8
Sequence A:		

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Sequence B:

CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4

Earth Science (14 credits)

GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
PHYS 110	Introductory Astronomy	3
SOIL 217	Introduction to Meteorology & Climatology	3

Physics (12 credits)

PHYS 110 & 110L	Introductory Astronomy and Introductory Astronomy Lab	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Code	Title	Credits
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Tertiary Concentration

Select one tertiary concentration not selected as the primary or secondary concentrations.

Biology (8 credits)

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4

Chemistry (8 credits)

Select one introductory chemistry sequence (A or B) 8

Sequence A:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Sequence B:

CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	

Earth Science (8 credits)

GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4

Physics (8 credits)

PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
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PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
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Code	Title	Credits
Math Requirements		
Select the math requirement based on the choice of primary concentration.		
Biology or Earth Science (6-7 credits)		
MATH 105 or MATH 146	Trigonometry Applied Calculus I	3 or 4
STAT 330	Introductory Statistics	3
Chemistry (11 credits)		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 330	Introductory Statistics	3
Physics (18 credits)		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 129 or MATH 329	Basic Linear Algebra Intermediate Linear Algebra	3

Degree Requirements and Notes

- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Students who select Physics as their Primary Concentration can add Mathematics as an additional teacher licensure area with 6 additional credits. See your academic advisor for details.

Computer Engineering

Department Information

- **Department Location:**
Electrical and Computer Engineering
- **Department Phone:**
701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ (<http://www.ndsu.edu/ece/>)
- **Credential Offered:**
B.S.Cpr.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/computer-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/computer-engineering/>)

Computer engineering deals with both hardware and software aspects of computer systems. Students take essential electrical engineering classes along with specialized classes in computer engineering and computer science. Demand for computer engineers is strong due to the growing use of computers in all sorts of products and the need for engineers competent with computers in both hardware and software areas.

The Program

Computer engineering is a degree program in the College of Engineering. The Computer Engineering program provides a background in three broad areas: computer hardware, software, and hardware-software integration. Fundamental topics included in the program are embedded systems, computer architecture, digital systems, software engineering, computer networks, and operating systems. In addition, the program includes core

subjects that are common to all engineering disciplines and basic university studies in humanities and social science. The Bachelor of Science degree in Computer Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

Areas of Specialization

The Computer Engineering program allows students to tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests.

Technical areas include the following:

Computer Architecture/Digital VLSI – VLSI designers and computer architects design computer system hardware, including how the CPU communicates with various types of memory and high-performance multi-processor systems. VLSI design focusses on the lower levels of abstraction: transistor-level and physical-level design; whereas computer architecture focuses on the higher levels of abstraction: architecture and gate-level designs.

Cyber Physical Systems – deals with the interaction of computing elements monitoring/controlling physical entities, often in a large network.

Embedded Systems – deals with the design of a dedicated computer system to perform a specific task, often requiring real-time constraints. An example is a smartphone.

Computer Systems – deals with the close interaction between a system's hardware and software.

The Facilities

The Electrical and Computer Engineering building is part of an eight building engineering complex. The building contains specialized laboratories and equipment. Numerous grants and donations from the National Science Foundation and private industry have provided valuable equipment. Laboratories along with department and University computer capabilities support education and research. Students also have full access to computer clusters located in the ECE building and throughout the campus. These and other major computer resources are tied to local, regional, national and international computer networks, and remote access is provided for all ECE software.

Selective Admission

Transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required Math must have a "C" or better before enrolling in ECE courses listed in the curriculums for Junior & Senior years."

High School Preparation

High school students should attempt to complete one unit of physics, four units of mathematics and one unit of chemistry.

Career Opportunities

Graduates may find work as design engineers (computer hardware, software and systems), computer consultants, sales and customer support engineers or as engineers involved with computer-aided manufacturing and testing.

Research and Graduate Study

Graduate studies leading to a master's degree or doctoral degree are offered in the department. Further details are available in the *Graduate Bulletin*.

Cooperative Education Program

The Cooperative Education Program allows students to alternate classroom study with a series of paid professional work experiences related to electrical and computer engineering. These experiences increase in complexity as the student's background increases. The program provides opportunities for pre-graduation experience in the profession, exploration of several career opportunities, money for education, an enriched degree and enhanced opportunities for employment following graduation.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CHEM 121		3 ECE 111 ¹	3
Wellness Gen Ed		2 ENGL 120	3

ECE 173		4 MATH 129	3
ENGL 110		3 MATH 166	4
MATH 165		4 PHYS 251	4
		16	17
Sophomore			
Fall	Credits	Spring	Credits
EE 206		4 COMM 110	3
MATH 265		4 ECE 320	3
CSCI 222		3 MATH 266	3
ECE 275		4 ECE 374	4
Science Lab Gen Ed		1 CSCI 161	4
		16	17
Junior			
Fall	Credits	Spring	Credits
CSCI 413		3 ECE 341	3
ECE 343		4 ECE 401	1
CSCI 459		3 ECE 376	4
ENGR 402		1 CSCI 474	3
ECE 474		3 ECE 375	3
		14	14
Senior			
Fall	Credits	Spring	Credits
ECE 403		2 ECE 405	3
ENGL/Upper Level Writing ²		3 ECE Elective or CSCI 467: Alg. Analysis	3
ECE Elective		3 Humanities/Fine Arts Gen Ed Elective	3
Tech Elective		3 Social/Behavioral Sci. Gen Ed Elective ⁴	3
Humanities/Fine Arts Gen Ed Elective ³		3 Tech Elective	3
Social/Behavioral Sci. Gen Ed		3	
		17	15
Total Credits: 126			

¹ Students must take ECE 111 prior to enrolling in ECE courses listed above in the Junior or Senior years; otherwise, students must take an additional ECE Elective in lieu of ECE 111.

² Select from ENGL 320, 321, 324 or 459 to satisfy the Upper Level Writing for General Education.

³ Suggested to take ENGR 311.

⁴ Suggested to take ENGR 312, ECON 105, ECON 201 or ECON 202..

PROGRAM NOTES:

ECE Elective: any didactic ECE 4xx course (not x93, 494, 496).

Tech Elective: any didactic 4xx course from ECE or CSCI, or any 33x, 35x, or 4xx level didactic ME course, or any of the following: CSCI 213, 336, CSCI 366, CSCI 372, ECE 311, ECE 321, ECE 351, ECE x93, ECE 494, ECE 496 (max 3 credits), ENGR 310, PHYS 252, IME 440, IME 456, IME 460, IME 470, BIOL 151/151L, BIOL 370 and BIOL 460.

Students must earn a "C" or better in ECE 173, ECE 275, EE 206 and all required MATH courses, before enrolling in ECE courses listed above in the Junior or Senior years.

Computer Engineering

Department Information

- **Department Location:**
Electrical and Computer Engineering
- **Department Phone:**
701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ (<http://www.ndsu.edu/ece/>)
- **Credential Offered:**
B.S.Cpr.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/computer-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/computer-engineering/#planofstudytext>)

Major Requirements

Major: Computer Engineering

Degree Type: B.S.Cpr.E.

Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Computer Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing	4
ECE 275	Digital Design	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	3
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 374	Computer Organization	4
ECE 375	Digital Design 2	3
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
Math Courses Required		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III (w/ vectors)	4
MATH 266	Introduction to Differential Equations	3
CSCI Courses Required		
CSCI 161	Computer Science II (May satisfy general education category S for Computer Engineering majors only))	4
CSCI 222	Discrete Mathematics	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 121L or PHYS 251L	General Chemistry I Laboratory (May satisfy general education category S) University Physics I Laboratory	1
EE 206	Circuit Analysis I	4
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 251	University Physics I (May satisfy general education category S)	4
Select one from the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Core Electives		12
Select 4 courses from the following:		
ECE 423	VLSI Design	
ECE 425	Introduction to Semiconductor Devices	
ECE 474	Computer Architecture	
ECE 477	Hardware Design for Machine Learning	
CSCI 467	Algorithm Analysis	
CSCI 474	Operating Systems Concepts	
ECE Electives		6

Select 6 credits from the following. A Core Elective from the section above may be used in this section if not taken as an ECE Core Elective.

ECE 321	Electronics II
ECE 424	Analog VLSI
ECE 444	Applied Digital Signal Processing
ECE 448	Image Analysis I
ECE 461	Control Systems I
ECE 463	Modern Control
ECE 470	Fault Tolerant Digital Systems
ECE 472	Design Automation of VLSI Circuits
ECE 476	Advanced Embedded Systems
ECE 483	Instrumentation for Engineers
ECE 485	Biomedical Engineering
CSCI 459	Foundations of Computer Networks
CSCI 413	Principles of Software Engineering

Tech Electives

3

Select 3 credits from the following:

CSCI 336	Theoretical Computer Science
CSCI 366	Database Systems
CSCI 372	Comparative Programming Languages
CSCI 4XX	Any CSCI 400 level didactic course
ECE 351	Applied Electromagnetics
ECE 4XX	Any ECE 400 level didactic course
ECE 494	Individual Study
ECE 496	Field Experience (max. of 3 cr.)
ENGR 310	Entrepreneurship for Engineers and Scientists
IME 440	Engineering Economy
IME 456	Program and Project Management
IME 460	Evaluation of Engineering Data
IME 470	Operations Research I
PHYS 252	University Physics II

Total Credits

100

Degree Requirements and Notes

- Transfer Students – Transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required MATH courses must have a “C” or better before enrolling in ECE courses listed in the curriculum for Junior & Senior years.
- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses taken at NDSU. Elective ECE courses are not included in this GPA requirement.
- All Students – Students are required to attain a grade of ‘C’ or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Computer Science

Department Information

- **Department Location:**
Quentin Burdick Building
- **Department Phone:**
701-231-8568
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/computer-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/computer-science/>)

Major Requirements

Major: Computer Science

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.S. Computer Science Core Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development with Frameworks	3
CSCI 336	Theoretical Computer Science	3

CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 445	Software Projects Capstone ¹	3
CSCI 455	Networking and Parallel Computation	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI 489	Social Implications of Computers ¹	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
STAT 367	Probability	3
STAT 368	Statistics	3
Track: Select one track from the four listed below		12
Total Credits		70

STANDARD TRACK

Code	Title	Credits
Select one of the following:		3
MATH 129	Basic Linear Algebra	
CSCI 277	Introduction to UNIX	
Computer Science Electives:		9
Select 3 didactic courses from any 300-400 level CSCI prefix courses that are not part of the core requirement.		
Total Credits		12

CYBERSECURITY TRACK

Code	Title	Credits
CSCI 277	Introduction to UNIX	3
Cybersecurity Electives:		9
Select 3 cybersecurity electives from CSCI 401-410		
or		
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
Total Credits		12

DATA SCIENCE TRACK

Code	Title	Credits
MATH 129	Basic Linear Algebra	3
Data Science Electives:		9
Select 3 data science electives from CSCI 420-428		
or		
CSCI 436	Intelligent Agents	
CSCI 450	Cloud Computing	
CSCI 479	Introduction to Data Mining	
GEOG 455	Introduction to Geographic Information Systems	
Total Credits		12

SOFTWARE ENGINEERING TRACK

Code	Title	Credits
Select one of the following:		3
MATH 129	Basic Linear Algebra	
CSCI 277	Introduction to UNIX	
Software Engineering Electives:		9

Select 3 software engineering electives from CSCI 411-419 that are not part of the core requirements

or

CSCI 450	Cloud Computing
CSCI 473	Foundations of the Digital Enterprise
CSCI 488	Human-Computer Interaction

Total Credits

12

- ¹ Department Capstone: CSCI 445 Software Projects Capstone (typically taken during the last spring semester prior to degree completion) & CSCI 489 Social Implications of Computers (typically taken during the last fall semester prior to degree completion)

Major Requirements

Major: Computer Science

Degree Type: B.A.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A Grade of 'C' or better is required for all CSCI prefix courses.

Code	Title	Credits
B.A. Computer Science Core Requirements		
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
CSCI 159	Computer Science Problem Solving	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 222	Discrete Mathematics	3
CSCI 313	Software Development with Frameworks	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 445	Software Projects Capstone ¹	3
CSCI 488	Human-Computer Interaction	3
CSCI 489	Social Implications of Computers ¹	3
Related Courses		
COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
MATH 146 or MATH 165	Applied Calculus I (May satisfy general education category R) Calculus I	4
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
Other Courses: Select these seven credits from the following areas:		7
Science (cannot be courses with the CSCI prefix)		
Engineering (cannot be ENGR 311 or ENGR 312)		
Math (a course with a number higher than MATH 147, but not MATH 165)		
Statistics (cannot be STAT 330 or STAT 331)		
Proficiency at the second year level in a modern foreign language.		
Total Credits		60

¹ CSCI 445 Software Projects Capstone & CSCI 489 Social Implications of Computers form the department capstone. CSCI 445 is typically taken during the last spring semester and CSCI 489 is typically taken during the last fall semester prior to degree completion.

Minor Requirements

Minor: Computer Science

Required Credits: 17

Minor Requirements

Code	Title	Credits
Required Courses		
CSCI 213	Modern Software Development	3
Choose one of the following two sequences:		7-8
CSCI 160 & CSCI 161	Computer Science I and Computer Science II	
CSCI 227 & CSCI 161	Computing Fundamentals I and Computer Science II	
Additional Electives: Select 6 or 7 credits to reach minor minimum (at least 3 credits must be CSCI 300-400 level).		6-7
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- A grade of 'C' or better is required in all courses applied to the computer science minor.

Computer Science

Department Information

- **Department Location:**
Quentin Burdick Building 258
- **Department Phone:**
701-231-8562
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science/>)

The Department of Computer Science at North Dakota State University offers course work leading to bachelor's, master's and doctoral degrees in computer science and, at the graduate level, in software engineering. Tracks in cybersecurity, data science, and software engineering are available for the B.S. in Computer Science. On the graduate level, certificates are available in cybersecurity and software engineering. The department is a designated Center for Academic Excellence in cybersecurity research (CAE-R) by the National Security Agency (NSA) and the Department of Homeland Security (DHS).

Background Information

As an undergraduate student, an advisor is assigned to help in choosing electives in their particular area of interest. For students with no or very limited computer experience, we offer introductory courses. In the standard curriculum for majors we offer three different tracks in cybersecurity, data science, and software engineering. Advanced undergraduate students may have the opportunity to take graduate courses while completing their undergraduate program. An extensive and varied set of elective courses in every aspect of computer science is available as well.

The Program

Both a B.A. and a B.S. in Computer Science are offered. We also offer several double majors, including Math and Computer Science, and Physics and Computer Science. An Accelerated Program is available for undergraduates with a 3.5 grade point average or better to complete a B.S. and an M.S. with a target graduation time of five years. In the Accelerated Program, graduate courses taken while an undergraduate student are used for both the B.S. and M.S. degree requirements.

We offer the most comprehensive and varied computer science programs in the region. In the core courses required of all majors, students are offered an opportunity to study concepts, applications and implementation techniques, which provide a broad and practical base both for a satisfying, well-paying career in computer science, and for advanced study. The curriculum offers an opportunity for an in-depth study of topics such as artificial intelligence, software engineering, cybersecurity, machine learning, data science, system simulation, computer communication networks, multimedia, operating systems, and database management systems. The department is expanding offerings in cybersecurity, data science, and software engineering. Students are encouraged to choose courses from related areas, such as business, economics, engineering, mathematics and statistics to broaden their program of study. Beginning in the junior year, students can explore co-op and internship opportunities to broaden their application of course-based knowledge. A senior capstone experience that provides a semester long project for industry is required and serves as an incredible opportunity to add maturity to the computer science skill set before graduation.

Career Opportunities

Computer scientists choose jobs in government, industry, teaching, research, agriculture, energy and other areas. A 2019 study showed that four of the eleven jobs with the most potential for growth are in areas taught by the Department. Graduates in computer science might choose a job in any of these areas: artificial intelligence, systems analysis, software development/engineering, security, information assurance, cybersecurity, bioinformatics, data science, web development, networking, information system development, database management, technical support, automatic systems, robotics, and internet of things.

According to the Federal Bureau of Labor Statistics, software engineers, cybersecurity analysts, network systems and data scientists / analysts, computer scientists and database administrators are expected to be among the fastest growing occupations. Employment of these computer specialists is expected to increase much faster than average. Our programs provide excellent foundations for successful careers in these areas. As an undergraduate student, you will find many opportunities to work part-time as a research assistant on campus, or as a paid intern with a local or regional business.

Graduates of our department have accepted employment in major national businesses including Hewlett-Packard, IBM, AT&T, Apple, CISCO Systems, Google, Adesto, Cargill, SGI, FAST Enterprises, Medtronic, Microsoft, Bobcat, Facebook, Digi-Key, John Deere, Amazon, Intel, Raytheon, Target Corp. and

Thomson Reuters. Many have chosen positions in North Dakota and adjoining states. There is a large and growing need for computer professionals in North Dakota.

During the final semester of their senior year, students take part in a capstone program. The objective of the capstone program is to provide the students with an experience that brings together the technical knowledge they have acquired while fostering valuable teamwork skills. This is accomplished by working in small teams on real-life projects. Capstone projects are done in conjunction with corporate, industrial or government clients/sponsors. Recent sponsors include Adventium, Aeritae Consulting, Appareo, ATC, Barglnns, BCBSND, Border States Electric, Botlink, Bushel, Capturis, Collins Aerospace, Fjorge, IBM, Inwerken, John Deere, Marvin Windows, Microsoft, NAU Country, Noridian, OpenStack, Pedigree Technologies, Scheels, and UGPTI.

The Facilities

The department is located in the Quentin Burdick Building along with Information Technology Services. Students have free access to a wide range of computer systems.

CS Department equipment includes two clusters of Linux workstations, a number of virtual machines, and Hadoop and Spark analytic systems. Research labs support Windows, Macs, and Linux computers along with various peripheral equipment such as a cyber range, drones, and 3D printers. The department and the University have assumed a leadership role in computer networking through the acquisition and implementation of high-bandwidth network switches. The University also has entered into a six-state consortium for extremely high-level networking in the Upper Midwest. The high-performance Center for Computationally Assisted Science and Technology (CCAST) is available for distributed research projects. We are also a charter member of Internet2 and have connectivity to the national vBNS research network. The department maintains numerous web servers for class assignments and other information, which are accessed by thousands of users each day. The University provides more than 1,000 computers in 133 instrumented classrooms, 46 public computer labs, 21 department-owned labs and other spaces supported by Information Technology Services. There are 54 GoPrint release stations on campus for student printing. Internet usage is available for all students.

High School Preparation

While NDSU offers remedial courses for students who have not had the opportunity to complete all college-preparatory coursework, we recommend taking courses in high school that develop the ability to think logically, to organize, and to analyze (e.g., algebra, geometry, trigonometry, statistics and calculus). NDSU accepts the results of some AP tests in lieu of college classes through our Credit by Examination policy.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.S. Calculus Ready 4-Year Plan

Freshman			
Fall	Credits	Spring	Credits
CSCI 160		4 CSCI 161	4
MATH 165		4 MATH 166	4
Gen Ed Science/Tech and Lab		4 ENGL 120	3
ENGL 110		3 Gen Ed Science/Tech	3
		Gen Ed HUM/FA and Cultural Diversity	3
		15	17
Sophomore			
Fall	Credits	Spring	Credits
CSCI 213		3 CSCI 313	3
CSCI 222		3 CSCI 336	3
COMM 110		3 Gen Ed Soc/Beh Sci and Global Perspectives	3
Gen Ed SOC/BehSci		3 Gen Ed Wellness	2-3
Gen Ed Science/Tech		3 Elective	3
		15	15

Junior			
Fall	Credits	Spring	Credits
CSCI 372		3 CSCI 467	3
STAT 367		3 STAT 368	3
CSCI 366		3 CSCI 374	3
Gen Ed HUM/FA		3 ENGL 321 or 324	3
CSCI Elective I		3 Elective	3
		15	15
Senior			
Fall	Credits	Spring	Credits
CSCI 489		3 CSCI 445	3
CSCI 474		3 CSCI Elective III	3
CSCI elective II		3 Additional Electives	9
Additional Electives		4	
		13	15

Total Credits: 120

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.S. Preparatory Mathematics Course Required

Freshman					
Fall	Credits	Spring	Credits		
CSCI 122 or 159		3 CSCI 160	4		
ENGL 110		3 ENGL 120	3		
Gen Ed Science and Tech		4 Gen Ed Science/Tech	3		
Pre-Calculus course per placement		3 Pre-Calculus course	3		
		13	13		
Sophomore					
Fall	Credits	Spring	Credits	Summer	Credits
CSCI 161		4 COMM 110	3	CSCI 213	3
MATH 165		4 MATH 166	4		
Gen Ed Science/Tech		3 Gen Ed Soc/Beh Sci and Glob Persp	3		
Gen Ed Soc/Beh Sci		3 Gen Ed Hum/FineArt and Cult Div	3		
Gen Ed Wellness		2 Elective	3		
		16	16		3
Junior					
Fall	Credits	Spring	Credits		
CSCI 222		3 CSCI 313	3		
CSCI 366		3 CSCI 336	3		
STAT 367		3 CSCI 374	3		
CSCI 372		3 STAT 368	3		

Gen Ed Hum/FineArt	3	Elective	3
	15		15
Senior			
Fall	Credits	Spring	Credits
CSCI Elective I	3	CSCI Elective III	3
CSCI Elective II	3	CSCI 445	3
CSCI 474	3	CSCI 467	3
CSCI 489	3	Electives	6
ENGL 321 or 324	3		
	15		15

Total Credits: 121

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.A. Plan of Study

First Year			
Fall	Credits	Spring	Credits
CSCI 159		3 ENGL 120	3
MATH 105		3 CSCI 160	4
CSCI 114		3 MATH 146	4
ENGL 110		3 First Year Language 102	4
First Year Language 101		4	
		16	15
Second Year			
Fall	Credits	Spring	Credits
CSCI 161		4 COMM 110	3
COMM 260		3 CSCI 222	3
Second Year Language 201		3 CSCI 371	3
Gen Ed Soc/Beh Sci		3 Second Year Language 202	3
		Elective	3
		13	15
Third Year			
Fall	Credits	Spring	Credits
CSCI 213		3 CSCI 313	3
STAT 330		3 STAT 331	2
COMM 261		3 ENGL 321 or 324	3
Gen Ed Wellness		2 Gen Ed Science	3
Gen Ed Science and Tech/Lab		4 Gen Ed Soc/Beh Sci	3
		15	14
Fourth Year			
Fall	Credits	Spring	Credits
CSCI 366		3 CSCI 445	3
CSCI 489		3 Elective (#300 or higher)	3

CSCI 488	3 Gen Ed	6
Elective (#300 or higher)	3 Electives	4
Elective	6	
	18	16

Total Credits: 122

Computer Science and Mathematics

Department Information

- **Department Location:**
Quentin Burdick Building or Minard Hall
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-mathematics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-mathematics/>)

This option is available for students who wish to take advantage of the close connections between Computer Science and Mathematics.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CSCI 160		4 CSCI 161	4
MATH 129		3 MATH 166	4
MATH 165		4 COMM 110	3
ENGL 110		3 Gen Ed Science/Tech and Lab	4
		Gen Ed Wellness	2-3
		14	18
Second Year			
Fall	Credits	Spring	Credits
CSCI 213		3 CSCI 313	3
MATH 265		4 MATH 266	3
MATH 270		3 MATH 329	3
STAT 367		3 STAT 368	3
Gen Ed Science/Tech		3 Gen Ed Science/Tech	3
		16	15
Third Year			
Fall	Credits	Spring	Credits
CSCI 366		3 CSCI 336	3
CSCI 372		3 CSCI 467	3
CSCI 374		3 MATH 300-400 level	3
MATH 420		3 Gen Ed Upper Division Writing	3

Gen Ed Humanities/Fine Art and Cult Diversity		3	Gen Ed Social/Behavioral Sci and Glob Perspective		3
		15			15
Fourth Year					
Fall	Credits		Spring	Credits	
CSCI 489		3	CSCI 445		3
MATH 491		1-5	Additional CSCI (418 or 453) or any 400 Level MATH course		3
MATH 300-400 level		3	Gen Ed Social/Behavioral Science		3
Gen Ed Humanities/Fine Art		3	Elective		4
Elective		3			
		14			13
Total Credits: 120					

Computer Science and Mathematics

Department Information

- **Department Location:**
Quentin Burdick Building or Minard Hall
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/computer-science-mathematics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/computer-science-mathematics/#planofstudytext>)

Major Requirements

Major: Computer Science & Mathematics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		

Quantitative Reasoning (R) [†]	3
Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{*†}	
Global Perspectives (G) ^{*†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in MATH & CSCI prefix courses used toward the major.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 420	Abstract Algebra I	3
MATH 491	Seminar	2
Choose 6 credits of 300-400 level Math courses (we recommend two of the following):		6
MATH 421	Abstract Algebra II	
MATH 430	Graph Theory	
MATH 436	Combinatorics	
MATH 488	Numerical Analysis	
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 313	Software Development with Frameworks	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 445	Software Projects Capstone	3
CSCI 467	Algorithm Analysis	3
CSCI 489	Social Implications of Computers	3
Choose 3 credits of 300-400 level CSci courses (we recommend one of the following):		3
CSCI 455	Networking and Parallel Computation	
CSCI 474	Operating Systems Concepts	
or any course numbered 420-429		
Related Required Courses		
STAT 367	Probability	3

STAT 368	Statistics	3
Total Credits		79

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science and Physics

Department Information

- **Department Location:**
Quentin Burdick Building or South Engineering
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/computer-science-physics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/computer-science-physics/>)

Major Requirements

Major: Computer Science & Physics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required for all CSCI, PHYS, and AST prefix courses.

Code	Title	Credits
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 189	Skills for Academic Success ¹	1
CSCI 213	Modern Software Development	3
CSCI 336	Theoretical Computer Science	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI Electives	CSCI 313 and/or any 400-level CSCI course that is not already used.	6
Physics Major Requirements:		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics at MSUM)	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
Physics Electives: Select from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 463	Statistical Mechanics	
PHYS 481	Condensed Matter Physics	
PHYS 488	Senior Project I (If not used to satisfy project requirement)	
PHYS 489	Senior Project II (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permission.	
Related Required Courses		
MATH 129 or MATH 329	Basic Linear Algebra Intermediate Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4

MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
CSCI 445	Software Projects Capstone	3
or PHYS 488 & PHYS 489	Senior Project I and Senior Project II	

Total Credits **103**

¹ CSCI 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take CSCI 189.

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science and Physics

Department Information

- **Department Location:**
Quentin Burdick Building or South Engineering
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-physics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/computer-science-physics/>)

Since the dawn of the computer age, Computer Science and Physics have been closely intertwined disciplines. Computational physics is now an established branch of physics, complementing experiment and theory, that develops and applies computer modeling approaches to the solution of a wide range of physical problems. At the same time, software development (e.g., for graphics and data mining applications) is increasingly inspired by physics. Computer modeling, including simulation and numerical analysis, is an essential component of modern research and development. Correspondingly, the demand is growing for scientists with multidisciplinary training that combines fundamental knowledge of physics and computer science with practical skills in programming and computation. The Computer Science and Physics double major program is designed to allow students to complete the core requirements of both majors in a four-year degree. Graduates of the program will have a unique background qualifying them to work in industry or to pursue graduate studies in physics, computer science, engineering, or other technical fields.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
PHYS 171		1 ENGL 120	3
MATH 165		4 PHYS 251 & 251L	5
CSCI 160		4 PHYS 251R	1
CSCI 189		1 MATH 129 or 329	3
ENGL 110 (Based on placement)		3 MATH 166	4
Wellness Gen Ed		2 CSCI 161	4
		15	20

Sophomore			
Fall	Credits	Spring	Credits
PHYS 252 & 252L		5 PHYS 350	3
PHYS 252R		1 MATH 266	3
MATH 265		4 COMM 110	3
CSCI 213		3 CSCI 336	3
MATH 270		3 Humanities/Fine Arts Gen Ed	3
		16	15
Junior			
Fall	Credits	Spring	Credits
PHYS 360		3 PHYS 370	3
CSCI 366		3 ENGL 324	3
PHYS 355		3 PHYS 361	3
Social/Behavioral Sci and Cult Diversity Gen Ed		3 CSCI 372	3
Humanities/Fine Arts & Global Perspectives Gen Ed		3 CSCI 374	3
		15	15
Senior			
Fall	Credits	Spring	Credits
PHYS 361		3 PHYS 489	2
PHYS 462		3 CSCI 467	3
Physics Elective		3 PHYS 486	3
CSCI 474		3 CSCI 313	3
CSCI 4XX Computer Science Elective		3 or CSCI 4XX Computer Science Elective	
PHYS 485		3 Humanities/Fine Arts Gen Ed	3
PHYS 488		1 Social/Behavioral Science Gen Ed	3
		19	17

Total Credits: 132

Construction Engineering

Department Information

- **Department Location:**
Engineering Bldg 106
- **Department Phone:**
701-231-6202
- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Credential Offered:**
B.S.Cons.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/construction-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/construction-engineering/>)

The construction industry is one of the largest industries in the United States. It accounts for nearly 8 percent of the nation's gross national product and employs millions of people. The industry is divided into four sectors: residential building construction, industrial construction, commercial building construction, and heavy civil construction. The Department of Construction Management and Engineering provides quality educational programs

that prepare nationally competitive undergraduate and graduate students for successful careers in the construction engineering and management professions.

The Program

Construction Engineering involves the planning, design, and management of construction facilities, such as highways, bridges, airports, railroads, buildings, dams, and reservoirs. The construction of such projects requires the knowledge of engineering, management, economics, and business. Construction Engineering is differentiated from Construction Management from the standpoint of the use of math, science, and engineering to design projects and processes and analyze problems. Construction Engineering is involved in a variety of construction disciplines, including: commercial, residential, transportation, and infrastructure systems. Construction Engineers are also involved in the engineering design of temporary structures, cost estimating, planning and scheduling, material procurement, selection of equipment, and cost control. Due to their diverse skills, there is a very high demand for Construction Engineers.

The Department offers a Bachelor of Science in Construction Engineering degree which offers a blend of engineering and construction courses. The program is designed for those who want to work in the construction industry and become prepared for licensure as a professional engineer. A thorough knowledge of the physical sciences, math, and engineering is developed during the first two years followed by construction management and engineering courses. The technical side of the program is balanced with requirements in writing, humanities, social science, and communications. The Bachelor of Science in Construction Engineering degree is accredited by the Engineering Accreditation Commission of ABET, www.abet.org (<https://www.abet.org/>).

Program Educational Objectives (PEO)

Program educational objectives (PEO's) are broad statements that describe what graduates are expected to attain within a few years after graduation. Program educational objectives are based on the needs of the program's constituencies. Graduates from the Bachelor of Science in Construction Engineering program are expected to be productive construction engineers who, within the first few years after graduation:

1. Begin to serve in a middle-level project leadership role in their construction engineering career.
2. Acquire and use new knowledge and skills in the construction engineering field.
3. Be respected construction engineers who are valued by their peers, customers, and the general public for their technical expertise and ethical conduct.

Student Outcomes (SO)

The Program Educational Objectives are further connected to seven Student Outcomes (SO), developed by the Engineering Accreditation Commission of ABET, www.abet.org, (<https://www.abet.org/>) which describe what students are expected to know and be able to do by the time of graduation. These outcomes relate to the skills, knowledge, and behaviors that students acquire in their matriculation through the program. The Student Outcomes are listed below:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

4+1 PROGRAMS

Option 1: the BSConE + MCM (4+1) program provides the opportunities for current students in the Construction Engineering program to pursue the Master of Construction Management (MCM) offered by the department. Students in the Construction Engineering program have an option to obtain a Master degree through the 4+1 accelerated BSConE + MCM program, which requires at least a total of 30 semester credits. Up to 9 credits (three courses) from the Construction Engineering BS program can be double counted to the MCM program. However, these courses must be taken in the 600 or 700 level. In that sense, the interested students could accelerate the master study by shortening three courses, so they could complete the remaining 21 credits plus the completion of the master thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Construction Engineering BS degree.

A separate application to the 4+1 programs is required. Applicants could apply their admissions at their junior year (having accumulated more than 60 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master graduate student admissions.

Application procedure:

- Interested and eligible students must submit a Combined/Accelerated Program Degree Program Declaration form to the department office at <https://www.ndsu.edu/fileadmin/registrar/forms/accelerated.pdf>.
- Next, the student's academic advisor will evaluate the substitution of the graduate level courses into the undergraduate program, followed by the final review and approval from the Department Chair. A maximum of 9 graduate student credits* may be applied to the undergraduate degree.
- After receiving the necessary approvals noted above, the student will submit this form to the Graduate College and formally apply for admission to the graduate program.
- All admissions to the Graduate College will be conditional. The minimum condition is completion of the bachelor's degree prior to full standing in master's program, and maintaining a 3.0 cumulative GPA in their graduate classes.
- No undergraduate course may be counted toward a master's degree.
- Students entering the master's degree with a bachelor's degree in hand may not use courses earned as part of the bachelor's program for master's requirements, even if those courses were graduate level courses.
- Students must meet all of the requirements that would ordinarily be expected of those enrolled in the MCM program.

The graduate-level courses** that can be taken:

- CM&E 605: Construction Support Operations (instead of CM&E 405: Construction Support Operations)
- CM&E 603: Scheduling and Project Control (instead of CM&E 403: Scheduling and Project Control)
- CM&E 715: Construction Specifications and Contracts (instead of CM&E 315: Specifications and Contracts)

* Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid, but are not covered under the tuition cap. Mandatory Student fees, however, are capped at 12 credits, regardless of program.

** Note: A substitution form is required for the 600/700-level courses to officially apply to the BS degree. This is submitted after they have enrolled in the class(es).

Option 2: students in the Construction Engineering program have an option to obtain a Master degree through the 4+1 accelerated BSCE or BSConE + MSCE program, which requires at least a total of 24 semester credits and 6 master thesis credits. Up to 9 credits (three courses) from the Construction Engineering BS program can be double counted to the MS program in Civil Engineering. However, these courses must be taken in the 600 or 700 level. In that sense, the interested students could accelerate the master study by shortening three courses, so that they could complete the remaining 15 credits plus the completion of the master thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Construction Engineering BS degree.

A separate application to the 4+1 program is required. Applicants could apply their admissions at their junior year (having accumulated more than 75 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master graduate student admissions.

Faculty and Staff

The Department has a group of faculty and staff members dedicated to teaching, advising and career consultation. All full-time faculty members have doctoral degrees. Many of them have professional licenses such as the Professional Engineer (PE) and/or the Certified Professional Constructor (CPC), and have construction related working experiences both nationally and internationally. Additionally, the department has many Adjunct professors who are currently working in the construction industry in supervisory roles.

Facilities

The Department has well equipped classrooms, computer labs and teaching and research labs for its students. Classrooms used by the department are equipped with a computer, a Blackboard course management system, Internet access, a projector, a document camera, and an apple TV/AirMedia system. In addition, the department maintains a computer lab, a virtual reality lab, a concrete lab and a soils lab and shares laboratory space with the Civil and Environmental Engineering Programs for the structural, geotechnical and surveying labs. The department has the most updated modern teaching and research equipment such as GPS units, robotic total stations, drones, etc.

Career Opportunities

Construction engineering graduates are in high demand after graduation by contractors in all types of construction, from design-construction firms to large owners who have continuing construction projects. Positions available include field engineer, office engineer, project engineer, project controls engineer, superintendent and project manager. Starting salary has been between \$50,000 and \$80,000 in the recent years. Summer internships or employment in the construction industry is also available to construction engineering students.

Industry advisory council

The Industry Advisory Council (IAC) consists of 35 members who specialize in different sectors throughout the construction industry. The IAC helps the program develop the professional body of knowledge appropriate to construction management and engineering. They serve as a liaison between

the construction industry and the Department. They advance and support the highest quality faculty, and educational facilities for the student enrolled in the programs. Through active participation, the IAC offers advice, counsel, and provides industry's vision for the program.

Student Organizations

There are four student organizations in the Department of Construction Management and Engineering: Associated General Contractors of America (AGC), National Association of Home Builders (NAHB), Sigma Lambda Chi (SLC), and Student Advisory Board (SAB). AGC Student Chapter competes each year at the Associated Schools of Construction Competition and the Midwest Construction Quiz Bowl. NAHB Student Chapter competes each year at the Residential Construction Management Competition. SLC is an international construction honor society. SAB provides advising and best practices to first year freshmen, and provides student feedback to the program.

Scholarship Opportunities

The AGC of North Dakota and the Fargo/Moorhead Home Builders Care Foundation (a charitable arm of the Home Builders Association of Fargo-Moorhead) offer annual scholarships to incoming freshman and outstanding existing students. In addition, many other scholarships, such as Cossette Construction Management and Engineering Scholarship, Excellence in Construction Safety Scholarship and Interstates Construction Management and Engineering Scholarship, are available to students. Students can contact the Office of Admission for more information or check the department website at https://www.ndsu.edu/construction/current_students/scholarships/.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CM&E 111		1 CM&E 212	3
CM&E 200		3 MATH 166	4
MATH 165 (Gen Ed R Category)		4 ENGL 120 (Gen Ed C Category)	3
ENGL 110 (Gen Ed C Category)		3 CHEM 122 (Gen Ed S Category)	3
CHEM 121 (Gen Ed S Category)		3 ME 221	3
CHEM 121L (Gen Ed L Category)		1 Economics (Gen Ed B/G Category)*	3
		15	19
Sophomore			
Fall	Credits	Spring	Credits
CM&E 204		3 CM&E 240	3
Social Behavior (Gen Ed B Category)		3 PHYS 252 (Gen Ed S Category)	4
MATH 128		1 COMM 110 (Gen Ed C Category)	3
MATH 259		3 MATH 266	3
ME 222		3 ME 223	3
GEOL 105 or 106 (Gen Ed S Category)		3 Wellness (Gen Ed W Category)	2
		16	18
Junior			
Fall	Credits	Spring	Credits
CM&E 305		3 CM&E 301	3
CM&E 380		3 CM&E 315	3
CE 309		3 CE 303	2
CE 316		3 CE 303L	1
STAT 330 (Gen Ed R Category)		3 CE 343	4
		CM&E 405	3
		15	16

Senior			
Fall	Credits	Spring	Credits
CM&E 403		3 CM&E 489	3
4XX Technical Elective**		3 4XX Technical Elective**	3
4XX Technical Elective**		3 4XX Technical Elective**	3
ENGL 320 or 321 (Gen Ed C Category)		3 Humanities/Fine Arts (Gen Ed A Category)	3
Humanities & Diversity (Gen Ed A&D Category)		3 BUSN 431	3
ENGR 402		1	
		16	15

Total Credits: 130

*To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G.

** Refer to list of Construction Engineering Technical Electives (https://www.ndsu.edu/fileadmin/construction/Documents/List_of_Technical_Electives.pdf) (CE 400 Level Courses) Minimum 12 Credits)

Gen Ed Category description can be found on the General Education page (p. 53).

Construction Engineering

Department Information

- **Department Location:**
Engineering Bldg 106
- **Department Phone:**
701-231-6202
- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Credential Offered:**
B.S.Cons.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/construction-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/construction-engineering/#planofstudytext>)

Major Requirements

Major: Construction Engineering

Degree Type: B.S.Cons.E.

Minimum Degree Credits to Graduate: 131

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

major requirements

Code	Title	Credits
Construction Engineering Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3
CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control	3
CM&E 405	Construction Support Operations	3
CM&E 489	Construction Design Capstone	3
CE Courses:		
CE 303 & 303L	Civil Engineering Materials and Civil Engineering Materials Laboratory	3
CE 309	Fluid Mechanics	3
CE 316	Soil Mechanics	3
CE 343	Structural Engineering and Analysis	4
CE 400 Level Courses: Select 12 credits from the following:		12
CM&E 465	Bridge Engineering and Management	
CM&E 475	Design of Site Erosion Control	
CE 404	Reinforced Concrete	
CE 408	Water Resources and Supply	
CE 411	Design of Pre-stressed Concrete	
CE 417	Slope Stability and Retaining Walls	
CE 419	Pavement Design	
CE 421	Open Channel Flow	

CE 430	Timber and Form Design	
CE 441	Finite Element Analysis	
CE 444	Structural Steel Design	
CE 461	Foundation Engineering	
CE 462	Designing with Geosynthetics	
CE 478	Water Quality Management	
ME Courses Required:		
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
Math Courses Required:		
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Additional Courses:		
BUSN 431	Business Law I-Contracts, Property and Torts	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
ENGL 320 or ENGL 321	Business and Professional Writing (May satisfy general education category C) Writing in the Technical Professions	3
GEOL 105 or GEOL 106	Physical Geology (May satisfy general education category S) The Earth Through Time	3
PHYS 252	University Physics II (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one from the following (May satisfy general education category B & G):		3 or 6
ECON 105	Elements of Economics	
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics	

Total Credits**110-113**

Degree Requirements and Notes

- A minimum 2.50 cumulative GPA is required for transfer students to be admitted to the B.S. in construction engineering program.
- To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirement.

Construction Management

Department Information

- **Department Location:**
Engineering Bldg 106
- **Department Phone:**
701-231-6202
- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Credential Offered:**
B.S.Cons.M.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/construction-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/construction-management/>)

The construction industry is one of the largest industries in the United States. It accounts for nearly 8 percent of the nation's gross national product and employs millions of people. The industry is divided into four sectors including residential building construction, industrial construction, commercial building construction, and heavy civil construction. The Department of Construction Management and Engineering provides quality educational programs that prepare nationally competitive undergraduate and graduate students for successful careers in the construction engineering and management professions.

The Program

Construction management is a combination of technology, construction techniques, and management to meet the needs of the rapidly growing construction industry. Construction management studies less math and engineering concepts than construction engineering, but focuses more on business related courses. The program is designed to prepare students for the art of achieving maximum profit by efficient use of people, machines, materials and other resources to complete a construction project on time and to the satisfaction of the owner. A meld of engineering, construction, management and business gives the student a background and understanding of a management point of view in the construction industry. The program leading to Bachelor of Science in Construction Management degree is accredited by the American Council for Construction Education (ACCE), <http://www.acce-hq.org>.

A minor in Business Administration offered by the College of Business is required for all B.S. in Construction Management students. Students are required to have a minimum cumulative GPA of 2.50 to be admitted into the minor program. A minor in Business Administration requires a minimum GPA of 2.50 in the courses that satisfy the minor. In addition, a cumulative GPA of 2.50 overall is required to graduate with a Bachelor of Science in Construction Management degree.

Program Objectives

1. Provide construction students the basic skills necessary to plan, organize, and control resources to manage the overall construction process.
2. Provide construction students the technical knowledge and problem solving skills for a career in construction.
3. Provide construction students the knowledge and skills necessary to identify, define, and compare design alternatives.
4. Provide construction students necessary communication skills for the successful practice of the construction profession.
5. Provide construction students the professional opportunities and skills to pursue lifelong learning within the broader societal context of the construction profession.

The Program Objectives support the department goals defined in the strategic plan that relates to the undergraduate program, and are further connected to the Program Learning Outcomes.

STUDENT Learning Outcomes

The Construction Management program has adopted the 20 Student Learning Outcomes (SLOs) defined by ACCE as its Student Learning Outcomes. Upon graduation from the Construction Management program, graduates shall be able to:

1. Create written communications appropriate to the construction discipline.
2. Create oral presentations appropriate to the construction discipline.
3. Create a construction project safety plan.
4. Create construction project cost estimates.
5. Create construction project schedules.
6. Analyze professional decisions based on ethical principles.
7. Analyze construction documents for planning and management of construction processes.
8. Analyze methods, materials, and equipment used to construct projects.
9. Apply construction management skills as a member of a multi-disciplinary team.
10. Apply electronic-based technology to manage the construction process.
11. Apply basic surveying techniques for construction layout and control.
12. Understand different methods of project delivery and the roles and responsibilities of all constituencies involved in the design and construction process.
13. Understand construction risk management.
14. Understand construction accounting and cost control.
15. Understand construction quality assurance and control.
16. Understand construction project control processes.
17. Understand the legal implications of contract, common, and regulatory law to manage a construction project.
18. Understand the basic principles of sustainable construction.
19. Understand the basic principles of structural behavior.
20. Understand the basic principles of mechanical, electrical and piping systems.

FACULTY AND STAFF

The Department has a group of faculty and staff members dedicated to teaching, advising and career consultation. All full-time faculty members have doctoral degrees. Many of them have professional licenses such as the Professional Engineer (PE) and/or the Certified Professional Constructor (CPC), and have construction related working experiences both nationally and internationally. Additionally, the department has many Adjunct professors who are currently working in the construction industry in supervisory roles.

4+1 PROGRAM

The BSCM + MCM (4+1) program provide the opportunities for current students in the Construction Management program to pursue the Master of Construction Management (MCM) offered by the department. Students in the Construction Management program have an option to obtain a Master degree through the 4+1 accelerated BSCM + MCM program, which requires at least a total of 30 semester credits. Up to 9 credits (three courses) from the Construction Management BS program can be double counted to the MCM program. However, these courses must be taken in the 600 or 700 level. In that sense, the interested students could accelerate the master study by shortening three courses, so that they could complete the remaining 21 credits plus the completion of the master thesis and graduate in one year, while the total and design credit requirements for the technical elective courses stay the same for the Construction Management BS degree.

A separate application to the 4+1 programs is required. Applicants could apply their admissions at their junior year (having accumulated more than 60 credits) with an average accumulative GPA above 3.5. The review procedure for applications will follow the existing policy of master graduate student admissions.

Application procedure:

- Interested and eligible students must submit a Combined/Accelerated Program Degree Program Declaration form to the department office at <https://www.ndsu.edu/fileadmin/registrar/forms/accelerated.pdf>.
- Next, the student's academic advisor will evaluate the substitution of the graduate level courses into the undergraduate program, followed by the final review and approval from the Department Chair. A maximum of 9 graduate student credits* may be applied to the undergraduate degree.
- After receiving the necessary approvals noted above, the student will submit this form to the Graduate College and formally apply for admission to the graduate program.
- All admissions to the Graduate College will be conditional. The minimum condition is completion of the bachelor's degree prior to full standing in master's program, and maintaining a 3.0 cumulative GPA in their graduate classes.
- No undergraduate course may be counted toward a master's degree.
- Students entering the master's degree with a bachelor's degree in hand may not use courses earned as part of the bachelor's program for master's requirements, even if those courses were graduate level courses.
- Students must meet all of the requirements that would ordinarily be expected of those enrolled in the MCM program.

The graduate-level courses** that can be taken:

- CM&E 605: Construction Support Operations (instead of CM&E 405: Construction Support Operations)
- CM&E 603: Scheduling and Project Control (instead of CM&E 403: Scheduling and Project Control)
- CM&E 715: Construction Specifications and Contracts (instead of CM&E 315: Specifications and Contracts)

* Graduate tuition will be assessed for graduate credits approved for double-counting toward requirements for both undergraduate and graduate programs of study. Double-counted graduate credits count toward totals for financial aid, but are not covered under the tuition cap. Mandatory Student fees, however, are capped at 12 credits, regardless of program.

** Note: A substitution form is required for the 600/700-level courses to officially apply to the BS degree. This is submitted after they have enrolled in the class(es).

FACILITIES

The Department has well equipped classrooms, computer labs and teaching and research labs for its students. Classrooms used by the department are equipped with a computer, a Blackboard course management system, Internet access, a projector, a document camera, and an apple TV/AirMedia system. In addition, the department maintains a computer lab, a virtual reality lab, a concrete lab and a soils lab and shares laboratory space with the Civil Engineering Program for the structural and surveying labs. The department has the most updated modern teaching and research equipment such as GPS units, robotic total stations, drones, etc.

CAREER OPPORTUNITIES

Construction management graduates are in high demand after graduation by contractors in all types of construction, from general contractors to specialty contractors. Positions available include superintendent, project manager, and construction executive. Starting salary has been between \$50,000 and \$80,000 in the recent years. Summer internships or employment in the construction industry is also available to construction management students.

INDUSTRY ADVISORY COUNCIL

The Industry Advisory Council (IAC) consists of 35 members who specialize in different sectors throughout the construction industry. The IAC helps the program develop the professional body of knowledge appropriate to construction management and engineering. They serve as a liaison between the construction industry and the Department. They advance and support the highest quality faculty, and educational facilities for the student enrolled in the programs. Through active participation, the IAC offers advice, counsel, and provides industry's vision for the program.

STUDENT ORGANIZATIONS

There are four student organizations in the Department of Construction Management and Engineering: Associated General Contractors of America (AGC), National Association of Home Builders (NAHB), Sigma Lambda Chi (SLC), and Student Advisory Board (SAB). AGC Student Chapter competes each year at the Associated Schools of Construction Competition and the Midwest Construction Quiz Bowl. NAHB Student Chapter competes each year at the Residential Construction Management Competition. SLC is an international construction honor society. SAB provides advising and best practices to first year freshmen, and provides student feedback to the program.

SCHOLARSHIP OPPORTUNITIES

The AGC of North Dakota and the Fargo/Moorhead Home Builders Care Foundation (a charitable arm of the Home Builders Association of Fargo-Moorhead) offer annual scholarships to incoming freshman and outstanding existing students. In addition, many other scholarships, such as Cossette Construction Management and Engineering Scholarship, Excellence in Construction Safety Scholarship and Interstates Construction Management and Engineering Scholarship, are available to students. Students can contact the Office of Admission for more information or check the department website at https://www.ndsu.edu/construction/current_students/scholarships/.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CM&E 111		1 CM&E 212	3
CM&E 200		3 ENGL 120 (Gen Ed C Category)	3
ENGL 110 (Gen Ed C Category)		3 MATH 146 (Gen Ed R Category) [#]	4
MATH 105 or 107		3 COMM 110 (Gen Ed C Category)	3
CHEM 121 (Gen Ed S Category) [*]		3 Economics (Gen Ed B/G Category) ^{***}	3
CHEM 121L (Gen Ed L Category) [*]		1 Social Behavior Elective (Gen Ed B Category)	3
		14	19
Sophomore			
Fall	Credits	Spring	Credits
CM&E 204		3 CM&E 203	3
CM&E 250		3 CM&E 240	3
PHYS 211 (Gene Ed S Category) [*]		3 CM&E 260	3
PHYS 211L (Gene Ed L Category) [*]		1 Humanities (Gen Ed A Category)	3
GEOL 105 (Gene Ed S/G Category)		3 Humanities & Diversity (Gen Ed A&D Category)	3
ACCT 102		3	
		16	15
Junior			
Fall	Credits	Spring	Credits
CM&E 305		3 CM&E 301	3
CM&E 380		3 CM&E 315	3
STAT 330		3 CM&E 405	3

ENGL 320 or 321 (Gen Ed C Category)	3	BUSN 431 **	3
MGMT 320 **	3	MRKT 320 or FIN 320 **	3
	15		15
Senior			
Fall	Credits	Spring	Credits
CM&E 403		3 CM&E 450	3
CM&E 421		3 CM&E 453	3
CM&E 431		3 CM&E 488	3
Wellness (Gen Ed W Category)		Business Admin Minor 300/400	3
Business Admin Minor 300/400 Elective **		3 Business Admin Minor 300/400 Elective **	3
	12		15

Total Credits: 121

An overall minimum CGPA of 2.50 and a minor in Business Administration with a minor GPA of 2.50 are required to graduate with a B.S. in Construction Management.

*All science courses require the companion lab with the exception of geology.

**To be eligible for enrollment into 300/400 level courses offered by the College of Business requires application for a minor in Business Administration(BA).

*** To satisfy the Gen Ed Category B, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirements and the requirements for the Business Administration minor.

Gen Ed Category description can be found on the General Education page (p. 53).

Construction Management

Department Information

- **Department Location:**
Engineering Bldg 106
- **Department Phone:**
701-231-6202
- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Credential Offered:**
B.S.Cons.M.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/construction-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/construction-management/#planofstudytext>)

Major Requirements

Major: Construction Management

Degree Type: B.S.Cons.M.

Minimum Credits Required for Degree: 124

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Construction Management Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering	1
CM&E 200	Construction Documents and Codes	3
CM&E 203	Building Construction: Methods and Materials	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications	3
CM&E 240	Financial Cost Concepts for Construction Managers	3
CM&E 250	Construction Statics and Mechanics	3
CM&E 260	Soils and Foundations	3
CM&E 301	Construction Technology and Equipment	3
CM&E 305	Pre-Construction Management	3
CM&E 315	Specifications and Contracts	3
CM&E 380	Construction Estimating: Quantities and Costs	3
CM&E 403	Scheduling and Project Control	3
CM&E 405	Construction Support Operations	3
CM&E 421	Electrical and Mechanical Construction	3
CM&E 431	Sustainable Design and Construction	3
CM&E 450	Steel Design and Construction	3
CM&E 453	Concrete Design and Construction	3
CM&E 488	Construction Management Capstone	3

Additional Courses:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
ENGL 320 or ENGL 321	Business and Professional Writing (May satisfy general education category C) Writing in the Technical Professions	3
GEOL 105	Physical Geology (May satisfy general education category S)	3
MATH 105 or MATH 107	Trigonometry Precalculus	3
MATH 146	Applied Calculus I (May satisfy general education category R)	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics	3
Business Minor Courses:		24
ACCT 102	Fundamentals of Accounting	3
Select one from the following (May satisfy general education category B & G):		3 or 6
ECON 105	Elements of Economics	
ECON 201 & ECON 202	Principles of Microeconomics and Principles of Macroeconomics	
MGMT 320	Foundations of Management	3
MRKT 320 or FIN 320	Foundations of Marketing Principles of Finance	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
BA Minor 300/400 Elec. I		3
BA Minor 300/400 Elec. II		3
BA Minor 300/400 Elec. III		3
Students must apply for the minor through the College of Business and maintain a minimum 2.50 cumulative GPA to be eligible to enroll in all 300/400 level courses offered by the College of Business		
Total Credits		103-106

Degree Requirements and Notes

- An overall minimum cumulative GPA of 2.50 in all courses and a minor in Business Administration with a minor GPA of 2.50 are required to graduate with a B.S. in Construction Management.
- A cumulative GPA of 2.50 is required for both internal and external transfer students into this program.
- To satisfy the Gen Ed Category B requirements, a student can choose between two options: ECON 105 plus an additional course within Category B OR ECON 201 and ECON 202. Both options satisfy the Gen Ed Category G requirement and the requirements for the BA minor.

Creative Writing

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7143
- **Department Web Site:**
www.ndsu.edu/english/ (<http://www.ndsu.edu/english/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/creative-writing/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/creative-writing/>)

The Creative Writing minor develops flexible and innovative thinkers who can apply their ideas and communication abilities in whatever career they choose. A Creative Writing minor offers students a rigorous practice in the craft of multiple poetic and storytelling genres, as well as opportunities to develop research skills, and skills in close reading and analysis of literary texts. Students pursuing this minor take a sequence of seven courses designed to develop design thinking, project management skills, analytic abilities, writing skills, and an understanding of creative processes. These

skills are essential to the success of businesses and organizations in our region's fast-changing economy. The minor pairs well with majors in English Studies, Communication, Visual Arts, Theatre, Music, and other fields that value design thinking and creativity.

Creative Writing

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7143
- **Department Web Site:**
www.ndsu.edu/english/ (<http://www.ndsu.edu/english/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/creative-writing/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/creative-writing/>)

Minor Requirements

Minor: Creative Writing

Required Credits: 21

Code	Title	Credits
ENGL 229	Introduction to Creative Writing	3
ENGL 272	Literary Analysis	3
ENGL 322	Writing and the Creative Process	3
ENGL 423	Creative Writing Studio	3
Select 6 credits from the following:		6
ENGL 323	Creative Writing (select from the options listed here)	
	Creative Writing (Fiction - Fall semester)	
	Creative Writing (Poetry - Spring semester)	
	Creative Writing (Creative Non-Fiction - offered by demand)	
	Creative Writing (Scriptwriting - offered by demand)	
Select one course from the following:		3
ENGL 315	British Literature I	
ENGL 316	British Literature II	
ENGL 317	American Literature I	
ENGL 318	American Literature II	
ENGL 326	Writing in the Design Professions	
ENGL 330	Women's Writing	
ENGL 331	Contemporary Women Writers	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
ENGL 381	American Road Book	
ENGL 382	Film Genres and Styles	
ENGL 385	British Fiction	
ENGL 389	Non-fiction Prose	
ENGL 435	Young Adult Literature in a Multicultural World	

ENGL 471	American Realistic Literature
ENGL 472	20th Century American Writers
ENGL 474	Native American Literature
ENGL 476	Topics in American Literature
ENGL 480	Medieval Literature
ENGL 482	Renaissance Literature
ENGL 483	Topics in British Literature
ENGL 485	18th Century Literature
ENGL 486	Romantic Literature

Total Credits**21**

Criminal Justice

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/criminaljustice/ (<http://www.ndsu.edu/criminaljustice/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/criminal-justice/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/criminal-justice/#planofstudytext>)

Major Requirements

Major: Criminal Justice

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6

Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{*†}	
Global Perspectives (G) ^{*†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3
CJ 270	Introduction to Corrections	3
CJ 325	Applied Research Methods	3
or POLS 325	Applied Research Methods	
CJ 330	Criminal Law and Procedure	3
CJ 406	Crime and Delinquency	3
CJ 407	Deviant Behavior	3
CJ 460	Criminal Court System	3
CJ 461	Corrections	3
or CJ 410	Police & Society	
CJ 465	Women and Minorities in Criminal Justice	3
CJ 489	Senior Capstone in Criminal Justice	1
Criminal Justice Elective: Select 3 additional CJ prefix credits.		3

Using CJ 494 or CJ 496 to fulfill these electives requires permission from the department chairperson.

Additional requirements:

PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		46

Degree Requirements and Notes

- To graduate with a Criminal Justice major, a student must have a minimum GPA of 2.75 in CJ prefix courses and an overall cumulative GPA of 2.5.
- Only one re-take per Criminal Justice (CJ) course is allowed.

Minor Requirements

Minor: Criminal Justice

Required Credits: 18

Code	Title	Credits
Required Courses		
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology	3
CJ 270	Introduction to Corrections	3
CJ 300-400 Level	6 credits of CJ credits at the 300-400 level required. Using CJ 494 and CJ 496 to fulfill these electives requires permission from the department chairperson.	6
Total Credits		18

- * Students who do not complete a Research Methods course in their major program of study will be required to complete CJ 325 Applied Research Methods as part of their minor requirement.

Minor Requirements and Notes

- To graduate with Criminal Justice minor, a student must have a minimum GPA of 2.75 in CJ prefix courses and a cumulative GPA of 2.5.
- Only one re-take per CJ course is allowed.

Criminal Justice

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/criminaljustice/ (<http://www.ndsu.edu/criminaljustice/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/criminal-justice/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/criminal-justice/>)

Criminal justice as a discipline is concerned with the broad areas of law enforcement, courts and corrections, as well as criminological and legal theories which inform practice in these areas. The work of criminal justice practitioners may include police patrol, criminal investigations, supervising juveniles on probation, counseling and correctional work in institutions, group homes, or halfway houses, and other rewarding careers. Within these and other career fields, criminal justice practitioners enjoy exciting professional challenges and opportunities for serving society and helping people.

The Program

During the past few years, the demand for professionals in criminal justice-related careers has increased. Many criminal justice agencies and program administrators see a continuing need for qualified professionals. The criminal justice program at North Dakota State University has graduated

students who have pursued criminal justice careers in local, state and federal agencies throughout the United States. The program is designed so our graduates will succeed in both beginning and advancing their criminal justice careers.

Faculty and Facilities

The criminal justice program is administered by the Department of Criminal Justice. Faculty in the program provide teaching, research and practical expertise related to many issues in criminal justice. The Fargo-Moorhead community provides a rich source of criminal justice education through a wide variety of criminal justice agencies that work with student interns. The department is located in Putnam Hall 102.

PEACE OFFICER TRAINING AND LICENSURE

The Department of Criminal Justice has a relationship with Alexandria Community and Technical College in Alexandria, MN, which permits our students to attend the peace officer skills program there and ultimately obtain eligibility for peace officer licensure in Minnesota. NDSU criminal justice students are able to complete the skills training during the summer after their junior or senior year. Students interested in local law enforcement careers in North Dakota may complete the Alexandria skills training, or may take Lake Region State College's peace officer skills training program in Fargo or in Devils Lake, ND. More information about both skills training program options, and the career opportunities that follow, can be obtained from the Department of Criminal Justice.

Career Opportunities

Students graduating from this program have experienced much success in pursuing their career goals. Our alumni work in law enforcement, courts, correctional agencies, probation and parole departments and do so at the local, state and federal level. These jobs typically come with good salaries and benefits, although they vary from agency to agency. Types of agencies that have employed our graduates include police departments, sheriff's departments, planning agencies, group homes, juvenile courts, family courts, probation and parole departments, juvenile and adult correctional institutions, halfway houses, and many federal agencies (e.g. U.S. Marshals Service, Secret Service, and federal probation).

The Curriculum

The criminal justice curriculum is an interdisciplinary program drawing on the social sciences, behavioral sciences, humanities, and the law. Course requirements are based on the idea that our students should work through a curriculum that equips them with broad knowledge of the criminal justice system and criminological theory, and prepares them for a wide range of duties and professional responsibilities. The department also offers a minor in criminal justice and partners with the Department of Accounting and Information Systems on a fraud investigation minor.

Internship Program

Many students elect to complete an internship. This is usually done during their junior or senior year. Internship opportunities exist in many agencies in North Dakota and Minnesota and can be done at any time during the calendar year. By completing an internship, the student is able to combine the theoretical and applied aspects of professional preparation. Internship experience is an important element of successful job placement.

Criminal Justice Club

Students may expand their knowledge of criminal justice and career opportunities through the Criminal Justice Club. This student association allows participants to increase their knowledge and clarify career interests through field trips and meetings with professionals.

Accelerated Master's Program

Exceptional undergraduate students interested in pursuing a master's degree in criminal justice may apply in their junior year for admission into the department's accelerated master's program. This program allows students to complete certain courses which will count for both their bachelor's and master's degrees in criminal justice, thereby shortening the time it takes to complete the master's degree. Students interested in this option should consult with the department's graduate program coordinator or with their adviser.

The Faculty

Carol Archbold, Department Chair & Professor, Ph.D., 2002, University of Nebraska - Omaha

Jeffrey Bumgarner, Professor, Ph.D., 2000, University of Minnesota

Andrew Myer, Assistant Professor, Ph.D., 2010, University of Cincinnati

Amy Stichman, Associate Professor, Ph.D., 2003, University of Cincinnati

Kevin Thompson, Professor, Ph.D., 1986, University of Arizona

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CJ 201		3 CJ 230	3
MATH 104 or 103		3 CJ 210 or 270	3
ENGL 110		3 ENGL 120	3
ANTH 111 (Cultural Diversity)		3 COMM 110	3
PSYC 111		3 SOC 110	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
CJ 270 or 210		3 CJ 325 or POLS 325	3
STAT 330		3 AHSS Requirement	3
Science Gen Ed w/ Lab		4 Humanities / Fine Arts Gen Ed	3
AHSS Requirement		3 Science/Tech Gen Ed (Global Perspectives)	3
Elective		4 Minor	3
		17	15
Third Year			
Fall	Credits	Spring	Credits
CJ 406 or 407		3 CJ 460	3
CJ 330		3 CJ 410 or 461	3
ENGL 320 or 358		3 Science/Tech Gen Ed	3
Humanities / Fine Arts Gen Ed		3 AHSS Requirement	3
Wellness Gen Ed		2 Minor	3
		14	15
Fourth Year			
Fall	Credits	Spring	Credits
CJ 465		3 CJ elective	3
CJ 407 or 406		3 CJ elective	3
CJ 489		1 Minor	3
Minor		3 Minor	3
Minor		3 Minor or 300-400 level elective	3
		13	15
Total Credits: 119			

Crop and Weed Science

Department Information

- **Department Location:**
Loftsgard Hall
- **Department Phone:**
701-231-7971
- **Department Email:**
ndsu.plantsciences@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/plantsciences/undergraduate/crop-weed (<http://www.ag.ndsu.edu/plantsciences/undergraduate/crop-weed/>)
- **Credential Offered:**
B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/crop-weed-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/crop-weed-science/>)

The Crop and Weed Sciences (CWS) major in the Department of Plant Sciences is the study of grain and forage crop production, weed science, genetics, plant breeding, crop physiology and plant biotechnology. North Dakota is consistently the nation's leader for production of hard red spring wheat, durum wheat, barley, flax, dry edible beans, canola, dry peas, lentils and sunflower. North Dakota also ranks in the top 10 states for production of several other agronomic crops, including oat, rye, sugarbeet, and grass hay, and usually ranks third in total acreage of crops harvested. Income from sales of crops accounts for more than half of the North Dakota farmers' annual cash income. Crops utilized as livestock feed account for much of the cash income credited to livestock sales. Thus, North Dakota State University offers a setting well-suited for the study of crop and weed sciences.

Career Opportunities

Usually, more employment opportunities are available in CWS than there are qualified graduates. Producers require annual inputs such as seed, fertilizers and herbicides, so they seek assistance in sales or service areas such as crop consulting, chemical application and soil testing each year. Therefore, opportunities for CWS graduates usually have been more stable than in employment areas where inputs can be deferred when income is low. Also, salaries for CWS graduates are at or near the top among all graduates in agriculture due to the high demand for agronomists by many companies.

The employment opportunities in CWS can best be summarized by the jobs that our graduates have accepted. Our graduates have been employed as crop production consultants (agronomists); marketing experts for herbicides, fertilizers and other agricultural chemicals; managers of farm service centers for cooperatives and elevators; agents in the production and marketing of certified seeds; research technicians for private companies and universities; natural resources conservationists and agents for other governmental agencies; county agricultural extension agents; field representatives for sugarbeet or food processing companies; farm managers; farm insurance agents; research associates with private plant breeding companies; and persons involved in the reclamation of strip-mined land.

Typically 10 to 15 percent of the CWS graduates at NDSU return to farming or ranching and 5 to 10 percent continue their studies to receive graduate degrees. The median starting salary for a CWS graduate with a bachelor's degree was \$45,000 with \$2,750 median bonus in 2019. In addition, many employers provide health and retirement benefits, and some provide a vehicle and cell phone.

Many employers hire undergraduate students as interns for the summer months, and some hire for spring-summer semester or summer-fall semester periods. Several faculty hire students to help with research activities, and the Department of Plant Sciences also sponsors summer interns with an expressed interest in graduate school. The opportunities for summer interns, beginning with students between their freshman and sophomore years, have exceeded the supply of students for several years. The salary for interns often exceeds the income for alternative summer jobs. An internship provides excellent work experience and often results in a graduating senior being hired earlier and with a higher salary than students without comparable experience.

Financial Aid and Scholarships

Loans, scholarships, grants and the work-study program are available through Financial Aid and Scholarships. Students requiring assistance may contact the Office of Financial Aid and Scholarships or One Stop.

The Department of Plant Sciences awards several scholarships for use during the freshman, sophomore, junior and senior years. Additionally, scholarships are awarded to freshmen students by the College of Agriculture, Food Systems, and Natural Resources prior to enrollment. Applications for all college and departmental scholarships may be applied for online between December 1 and March 1, annually. Also, many undergraduate students are employed part-time during the school year and full-time during the summer months to assist with research or teaching activities.

Extra-Curricular Opportunities

The department sponsors the NDSU Agronomy Club. The Agronomy Club invites industry and academic experts to speak about professional opportunities and activities at club meetings. The club also arranges trips to local agriculture businesses and arranges community outreach activities. The Agronomy Club participates in regional and national contests that involve crop production and weed science. And the club annually attends conventions to learn about several aspects of agriculture in the North Central region.

curriculum Options

The department offers four options: agronomy, biotechnology, science and weed science. All students majoring or double majoring in CWS must meet the listed requirements. Students interested in a specific option will replace several of the elective courses listed in the sample curriculum with specific courses appropriate for that option.

- **Agronomy** – This option is the most popular. It deals with the technical aspects of agricultural production and management. It provides the most elective credits, which allows students to select courses that complement special interests in farming, marketing, business management, county extension work, etc.
- **Biotechnology** – This option is intended for students who wish to work as a technician or pursue graduate study in the crop biotechnology area.
- **Science** – This option deals with application of chemistry, botany, mathematics and physics to CWS. It is an excellent curriculum option for students intending to pursue a graduate degree in CWS.

- **Weed Science** – This option, which emphasizes proper use of herbicides and other agricultural chemicals, meets the demand for qualified personnel in marketing and application of agricultural chemicals. Also, this option provides a good background for crop production consultants (agronomists) and plant protection careers. The greatest emphasis is placed on weed control, but additional courses in entomology, plant pathology and soil science are required.

In addition, some faculty in plant sciences advise students interested in the Biotechnology and General Agriculture majors. The Biotechnology major is an interdisciplinary program that stresses basic and applied science courses and lab experience to prepare students for employment in the biotechnology industry or for graduate study. The General Agriculture program exposes students to disciplines within agriculture for careers with diverse course needs. This exposure is strengthened through selection of pertinent coursework in a minimum of four discipline areas.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
PLSC 189		1 SOIL 210	3
PLSC 110		3 BIOL 151	3
BIOL 150		3 BIOL 151L	1
BIOL 150L		1 ENGL 120	3
ENGL 110		3 Gen Ed Social & Behavioral Sci	3
MATH 103		3 Gen Ed Wellness	2
		14	15
Second Year			
Fall	Credits	Spring	Credits
PLSC 215		1 PLSC 225	3
PPTH 324		3 PLSC 312	1
CHEM 121		3 MICR 202	2
CHEM 121L		1 MICR 202L	1
COMM 110		3 CHEM 122	3
Gen Ed Humanities/Fine Arts & Cult Diversity		3 CHEM 122L	1
Free Elective		2 ECON 201	3
		STAT 330	3
		16	17
Third Year			
Fall	Credits	Spring	Credits
PLSC 320		3 PLSC 315	3
ENT 350		3 PLSC 315L	1
CHEM 240 or BOT 460		3 PLSC 323	3
Gen Ed Humanities/Fine Arts		3 SOIL 322	3
Free Elective		3 PLSC 380	3
		Free Elective	3
		15	16
Fourth Year			
Fall	Credits	Spring	Credits
PLSC 444		3 PLSC 455	3
PLSC upper level elective		2 PLSC 491	1

PLSC upper level elective	2 Free Elective	3
ENGL 320, 321, or 324	3 Free Elective	3
Free Elective	4 Free Elective	3
	14	13

Total Credits: 120

Crop and Weed Science

Department Information

- **Department Location:**
Loftsgard Hall
- **Department Phone:**
701-231-7971
- **Department Web Site:**
www.ag.ndsu.edu/plantsciences/ (<http://www.ag.ndsu.edu/plantsciences/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/crop-weed-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/crop-weed-science/#planofstudytext>)

Major Requirements

Major: Crop & Weed Sciences

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		

Global Perspectives (G) ^{†}****Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Required Courses for Crop & Weed Sciences		
PLSC 189	Skills for Academic Success	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ENT 350	General Entomology	3
PLSC 110	World Food Crops (May satisfy general education category S)	3
PLSC 215	Weed Identification	1
PLSC 225	Principles of Crop Production	3
PLSC 312	Expanding the Boundaries of Learning with Service	1
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
PLSC 320	Principles of Forage Production	3
PLSC 323	Principles of Weed Science	3
PLSC 444	Applied Plant Breeding and Research Methods	3
PLSC 455	Cropping Systems: An Integrated Approach	3
PLSC 491	Seminar	1
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Options: Select one of four options listed below.		19-30

The standard option for this major is Agronomy. Students who wish to declare a specific option must officially declare that option with the Office of Registration and Records.

Total Credits**76**

¹ AGRI189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

Agronomy Option - 19-20 Credits

For students interested in production agriculture; this option provides the most flexibility in course selection.

Code	Title	Credits
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 380	Principles of Plant Physiology	3
CHEM 240 or BIOC 260	Survey of Organic Chemistry Elements of Biochemistry	3-4

or BIOL 461	Plant Ecology	
MATH 103	College Algebra (or higher)	3
PLSC 300-400	(no more than 2 credits of co-op)	4
SOIL 322	Soil Fertility and Fertilizers	3

Total Credits	19-20
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Biotechnology Option - 19-21 Credits

For students who wish to work in the biotechnology industry or pursue graduate study in crop biotechnology.

Code	Title	Credits
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
PLSC 380	Principles of Plant Physiology	3
MATH 105	Trigonometry	3-4
or MATH 146	Applied Calculus I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 453	Advanced Weed Science	2-3
or PLSC 431	Intermediate Genetics	
PLSC 484	Plant Tissue Culture and Biotechnology	3

Total Credits	19-21
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Science Option - 30 Credits

For students interested in advanced study and want more foundation studies.

Code	Title	Credits
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 380	Principles of Plant Physiology	3
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146	Applied Calculus I	4
PLSC 300-400	(No more than 2 credits of co-op may be used)	4
Science and Math Electives		12

Total Credits	30
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Weed Science Option - 27-28 Credits

For students interested in crop consulting, weed science, and plant protection areas.

Code	Title	Credits
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 380	Principles of Plant Physiology	3
CHEM 240	Survey of Organic Chemistry	3-4
or BIOC 260	Elements of Biochemistry	
MATH 103	College Algebra (or higher level)	3
PLSC 433	Weed Biology and Ecology	2
PLSC 453	Advanced Weed Science	2
ENT 431	Principles of Insect Pest Management	3
PPTH 454	Diseases Of Field and Forage Crops	3
SOIL 322	Soil Fertility and Fertilizers	3

Total Credits	25-26
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Degree Requirements and Notes

- The program of study allows no more than 6 credits of cooperative education (co-op) to be counted toward degree requirements.

Minor Requirements

Minor: Crop & Weed Science

Required Credits: 18

Code	Title	Credits
Required		
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production	3
Elective Courses: Select two of the following:		6-7
PLSC 315 & 315L	Genetics and Genetics Laboratory (both must be taken to count as one selection)	
PLSC 320	Principles of Forage Production	
PLSC 323	Principles of Weed Science	
Elective Courses:		5-6
Other courses approved by the department:		
PLSC 215	Weed Identification	
SOIL 210	Introduction to Soil Science	
ENT 350	General Entomology	
PPTH 324	Introductory Plant Pathology	
PLSC 300-400	Level Course	
Total Credits		18-19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Dietetics

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/undergraduate_programs/dietetics/ (http://www.ndsu.edu/hnes/undergraduate_programs/dietetics/)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/dietetics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/dietetics/>)

Background Information

North Dakota State University has enjoyed a long-standing reputation in food and nutrition. Since 1925, NDSU has educated dietitians who are active nationwide in the profession of dietetics and leaders in professional organizations. The undergraduate program in dietetics is one of the finest in the nation. There are two undergraduate dietetics options at NDSU—the dietitian education program (DEP) with a concentration in community and sports nutrition, and the didactic program in dietetics (DPD).

A registered dietitian is a dietetic practitioner who has completed at least four years of college and earned a Bachelor of Science degree from an accredited program, as well as completing 1,000 hours of supervised practice. To become registered, a dietitian must pass a national registration examination. Dietitians are required to update their knowledge in continuing education during their careers. Beginning in 2024, all new dietitians entering the workforce will also be required to hold a master's degree.

Dietitian Education Program Option - Selective Admission

Accelerated BS/MS in Dietetics and Nutrition

The Accelerated BS/MS in Dietetics and Nutrition combines the required 1,000 hours of supervised practice with a Bachelor of Science in Dietetics and a Master of Science in Exercise Science and Nutrition. The accelerated program offers a concentration in community nutrition or sports nutrition. Students graduate at the end of five years with the necessary preparation to take the Commission on Dietetic Registration exam based on the 2024 standards. Students will complete a 3-phase application for this program. Students apply to the dietetics option by January 1 of year 2 (sophomore year), petition the graduate school the summer after year 2 (sophomore year) to apply to the accelerated option, and complete a graduate school application in the fall of year 3 (junior year). The Graduate Registration Exam (GRE) is NOT required for application. Students begin the program during the spring of year 3 (junior year). Acceptance to the program is limited. Transfer students are highly encouraged to contact the department early on for information if they intend to transfer to NDSU and enter the accelerated program. Applicants must have a minimum grade point average (GPA) of 3.5 with a 2.75 science GPA. The Accelerated BS/MS in Dietetics and Nutrition is accredited by the Academy of Nutrition and Dietetics Accreditation Council for Education in Nutrition and Dietetics (ACEND).

Didactic Program in Dietetics - Selective Admission

The DPD includes all academic course requirements of the Accreditation Council for Education in Nutrition and Dietetics (ACEND). Graduates earn a Bachelor of Science degree in dietetics. The application deadline is January 1 of the sophomore year. Applicants must have a minimum GPA of 3.0 with a 2.75 science GPA. Students accepted in the DPD should be aware that in order to become a Registered Dietitian they must complete an internship (DI), and should have a minimum 3.25 cumulative GPA. If the GPA is lower than that, it is less likely a student will be accepted into a DI. Work experience, volunteer or paid, in healthcare food service, or some other type of nutrition or community experience will enhance a student's chance to receive a DI. A student is eligible to take the registration examination to become a registered dietitian following successful completion of a DI. Dietetic internships are available across the United States and range in length from six to 12 months. Beginning in 2024, all new dietitians entering the workforce will also be required to hold a master's degree in addition to completing the DPD and DI. This program is also accredited by ACEND.

Additional Information

Career Opportunities

Dietitians are employed in facilities such as hospitals, clinics and long-term care, providing nutrition therapy as well as foodservice administration. Dietitians work in various fields including high school, college, and professional sports, in business as sales or educational professionals, for commercial and government establishments, or in community or clinical settings and public health. Some registered dietitians work for food commodity groups such as the Dairy Council or Wheat Commission. Dietitians work in education by teaching dietetics, nutrition and foodservice management in colleges, universities, medical schools and public school systems. In community settings, dietitians provide counseling and nutritional services for city and county health departments, older American feeding programs, child care centers, school foodservice programs and in retail settings like grocery stores. Dietitians also work in wellness centers, hospitals and consulting positions as part of the health promotion team.

The practice of dietetics is continuously changing as more research is conducted on foods and on the role of food in human health. Many dietitians work in hospital settings, either in clinical management or nutrition therapy as clinical dietitians. Clinical dietitians who work in nutrition therapy assess the nutritional needs of patients, plan menus, recommend or prescribe diets and nutritional support for patients, consult with physicians and direct educational programs on nutrition and special diets. They are members of the interdisciplinary team both in healthcare and wellness facilities.

Career Outlook

Placement surveys conducted in the Department of Health, Nutrition, and Exercise Sciences at NDSU show that more than 90 percent of the dietetics graduates obtain employment in their field within four months of graduation. It should be pointed out that employment is most favorable outside of Fargo. In recent study, it was projected there will be a continued demand for dietitians in both traditional and nontraditional areas for years to come. During college, many opportunities are available for students to obtain experience in the field. Some of those opportunities are offered through multiple healthcare facilities such as acute care hospitals and nursing homes, foodservice in a variety of venues, and public health service.

Academic Advisement

The Department of Health, Nutrition, and Exercise Sciences prides itself on giving individual attention and advisement to each student. A faculty advisor is assigned to each dietetics major. The academic advisor helps students set goals for their college work, helps them choose courses and encourages them to seek community work experience during their college career. In addition to the academic advisor, each incoming freshman and transfer student is assigned a student advisor to help with routine questions and to give assistance in adjusting to college life.

High School Preparation

Students interested in dietetics should have a background in the natural sciences and mathematics. Strong communication skills, both oral and written, is an advantage to students considering dietetics.

Scholarships

Numerous scholarships are available through the College of Human Sciences and Education and the Academy of Nutrition and Dietetics. Contact the department for more information or visit: https://www.ndsu.edu/hse/student_resources/hde_scholarships/

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CHEM 117		3 PSYC 211	3
PSYC 111		3 MICR 202	2
MATH 103		3 MICR 202L	1
ENGL 110		3 ENGL 120	3
Humanities/Fine Arts		3 Humanities	3
		Elective	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
BIOL 220		3 Applications are due for the DEP and DPD	
BIOL 220L		1 BIOC 260	4
HNES 250		3 BIOL 221	3
HNES 291		1 BIOL 221L	1
COMM 110		3 HNES 251	3
Elective		3 HNES 261	3
		HNES 261L	2
		14	16
Junior			
Fall	Credits	Spring	Credits
HNES 351		4 HNES 354	4
HNES 442		3 HNES 361	3
HNES 442L		3 HNES 361L	3
STAT 330		3 HNES 400	3
Upper Division Writing (Gen Ed Communication)		3 VETS 115	1
		16	14
Senior			
Fall	Credits	Spring	Credits
HNES 458		4 Elective	15
HNES 460		1	
HNES 481		1	
MGMT 320		3	
Elective		6	
		15	15
Total Credits: 120			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
CHEM 117		3 PSYC 211	3		
PSYC 111		3 MICR 202	2		
MATH 103		3 MICR 202L	1		
ENGL 110		3 ENGL 120	3		
Humanities/Fine Arts		3 Humanities	3		
		Elective	3		
		15	15		
Sophomore					
Fall	Credits	Spring	Credits		
BIOL 220		3 Applications are due for all dietetics options.			
BIOL 220L		1 BIOG 260	4		
HNES 250		3 BIOL 221	3		
HNES 291		1 BIOL 221L	1		
COMM 110		3 HNES 251	3		
Elective		6 HNES 261	3		
		HNES 261L	2		
		17	16		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
HNES 351		4 HNES 354		4 STAT 725 ²	3
HNES 442		3 HNES 354L		2	
HNES 442L		3 HNES 361		3	
STAT 330		3 HNES 361L		3	
Upper Division Writing (Gen Ed Communication)		3 HNES 400		3	
		VETS 115		1	
		16	16		3
Senior					
Fall	Credits	Spring	Credits	Summer	Credits
HNES 458 ¹		4 HNES 480		12 HNES 798 ²	3
HNES 458L		3 HNES 726 or 724 ²		3	
HNES 460 ¹		1 HNES 798 ²		1	
HNES 460L		1			
HNES 790 ²		1			
MGMT 320		3			
		13	16		3
Fifth Year					
Fall	Credits	Spring	Credits		
HNES 713 ²		3 HNES 798 ²	3		

HNES 735 ²	3	HNES 777 ²	3
HNES 710 ²	3		
	9		6

Total Credits: 145

- ¹ Accelerated BS/MS in Dietetics and Nutrition Students will take HNES 658 Advanced Medical Nutrition Therapy in place of HNES 458 and HNES 660 Leadership and Communication in Dietetics in place of HNES 460.
- ² These courses are taken by Accelerated BS/MS in Dietetics and Nutrition students. Undergraduate DEP students do not take these.

Accelerated BS/MS in Dietetics and Nutrition Degree Requirements

- If a student is interested in this option, they should speak with the Undergraduate Advisor for Dietetics in the College of Human Development & Education Academic Advising Center located in EML 270.
- Students intending to pursue the Accelerated option will need a 3.5 overall GPA and a 2.75 science GPA by the end of their 4th and 5th semesters to be eligible for the program.
- Students will also be required to complete a Combined/Accelerated Degree Program Declaration Form during the summer after semester 4 and then apply to the Graduate School during semester 5.
- GRE is not required.

Dietetics

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-7487
- **Department Web Site:**
www.ndsu.edu/undergraduate_programs/dietetics/ (http://www.ndsu.edu/undergraduate_programs/dietetics/)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/dietetics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/dietetics/>)

Major Requirements

Major: Dietetics

Option: Dietitian Education Program with Gerontology Concentration (DEP)

Option: Didactic Program in Dietetics (DPD)

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of "C" or better is required in all HNES prefix courses.

Code	Title	Credits
Dietetics Core Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
HNES 250	Nutrition Science (May satisfy general education category W)	3
HNES 251	Nutrition, Growth and Development	3
HNES 261 & 261L	Food Selection and Preparation Principles and Food Selection and Preparation Principles Laboratory	5
HNES 291	Seminar	1
HNES 351	Metabolic Basis of Nutrition	4
HNES 354	Introduction to Medical Nutrition Therapy	4
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	6
HNES 442 & 442L	Community Health and Nutrition Education and Community Health and Nutrition Laboratory	6
HNES 458	Advanced Medical Nutrition Therapy *	4
HNES 460	Leadership and Communication in Dietetics *	1
MGMT 320	Foundations of Management	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
PSYC 211	Introduction To Behavior Modification	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 115	Medical Terminology for the Paraprofessional	1
Select one of the following Dietetics Options listed below to complete the major:		4-21

Dietitian Education Program (DEP) - 21 credits

Didactic Program in Dietetics (DPD) - 4 credits

Total Credits 72-89

Code	Title	Credits
Dietitian Education Program (DEP)		
HNES 354L	Introduction to Medical Nutrition Therapy Laboratory	2
HNES 458L	Advanced Medical Nutrition Therapy Laboratory	3
HNES 480	Dietetics Practicum (Capstone Experience)	12
HNES 460L	Foodservice Systems Management II Laboratory	1
HNES 400	Interprofessional Health Care Practice	3
Total Credits		21

Code	Title	Credits
Didactic Program in Dietetics (DPD)		
HNES 481	Dietetics: Capstone Course for DPD	1
HNES 400	Interprofessional Health Care Practice	3
Total Credits		4

Degree Requirements and Notes

- A grade of 'C' or better is required for transfer courses in dietetics and food and nutrition.
- Minimum GPA requirements must be met (3.0 overall and 2.75 in sciences including BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, HNES 250, and MICR 202/L)
- A grade of 'C' or better is required for all required science courses (BIOC 260, BIOL 220/L, BIOL 221/L, CHEM 117, MICR 202/L)
- A grade of 'B' or better is required for HNES 250 - Nutrition Science

Code	Title	Credits
Accelerate BS/MS in Dietetics and Nutrition		
HNES 658	Advanced Medical Nutrition Therapy *	3-4
HNES 660	Leadership and Communication in Dietetics *	3

* Students approved to participate in the accelerated program (bachelors to masters program) will complete HNES 658 Advanced Medical Nutrition Therapy and HNES 660 Leadership and Communication in Dietetics in place of these 400 level courses.

Accelerate BS/MS in Dietetics and Nutrition Degree Requirements and Notes

- If a student is interested in this option, they should speak with the Undergraduate Advisor for Dietetics in the College of Human Development & Education Academic Advising Center located in EML 270.
- Students intending to pursue the Accelerated option will need a 3.5 overall GPA and a 2.75 science GPA by the end of their 4th and 5th semesters to be eligible for the program.
- Students will also be required to complete a Combined/Accelerated Degree Program Declaration Form during the summer after semester 4 and then apply to the Graduate School during semester 5.
- GRE is not required.

Earth Science Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/earth-science-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/earth-science-education/#planofstudytext>)

Major Requirements

Major: Earth Science Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4

ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category G)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	4
GEOG 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
GEOL 422 & GEOL 423	Petrology and Petrography	4
Pick one of the following math courses:		3-4
MATH 105	Trigonometry	
MATH 165	Calculus I	
PHYS 110 & 110L	Introductory Astronomy and Introductory Astronomy Lab	4
Pick one of the following:		4
PHYS 120 & 120L	Fundamentals of Physics and Fundamentals of Physics Laboratory	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
SOIL 210	Introduction to Soil Science	3
SOIL 217	Introduction to Meteorology & Climatology	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		96-97

Degree Requirements and Notes

- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

Earth Science Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**

www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)

- **Credential Offered:**

B.S.; B.A.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/earth-science-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/earth-science-education/>)

Earth science involves the study of earth and space systems, including areas such as astronomy, geology, meteorology and oceanography. Teaching earth science requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in secondary instruction. Accordingly, the earth science education major combines coursework across an interdisciplinary range of scientific fields with professional education courses on teaching and learning.

The Program

Candidates in earth science education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare majors to incorporate active learning strategies, to create effective methods for assessment, and to adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before applying to be formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teacher preparation program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced classroom teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate student teachers so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Earth science education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, candidates are eligible for certification to teach in most states. Candidates who take the Praxis Subject Assessment exam for Earth and Space Science will be licensed to teach earth science and related high school courses, as well as all middle school sciences. Candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CHEM 121 or 150 (Must be matching lecture and lab)		3 CHEM 122 or 151 (Must be matching lecture and lab)	3
CHEM 121L or 160 (Must be matching lecture and lab)		1 CHEM 122L or 161 (Must be matching lecture and lab)	1

GEOL 105 & 105L	4	COMM 110	3
ENGL 110 (or 120 College Composition II based on placement)	3	ENGL 120	3
MATH 105 or 165	3-4	GEOL 106	3
		GEOL 106L	1
14-15			14
Second Year			
Fall	Credits	Spring	Credits
BIOL 124 & BIOL 100L		4 BIOL 151 & 151L	4
BIOL 150 & 150L		4 EDUC 322	3
EDUC 321		3 GEOL 412	3
PHYS 110		3 PHYS 120 & 120L	4
Wellness Gen Ed		2 SOIL 217	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
16			17
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 EDUC 481	3
EDUC 489		3 GEOL 350 & GEOL 303 (Co-Requisites)	4
GEOL 420 & GEOL 421 (co-requisites; prereq: CHEM 121 or 150)		4 GEOL 422 & GEOL 423 (Co-Requisites; Prereq: GEOL 420)	4
STAT 330		3 Humanities & Fine Arts Gen Ed*	3
Social & Behavioral Science Gen Ed*		3	
16			14
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 482		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
ENGL 324		3 EDUC 488	3
Humanities & Fine Arts Gen Ed*		3	
Social & Behavioral Science Gen Ed*		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
15			13
Total Credits: 119-120			

* One of these General Education courses needs to be selected from Category D - Cultural Diversity.

Economics

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-7441
- **Department Email:**
ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/economics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/economics/>)

Economics is the social science that deals with problems of choice and decision making. It does so through a systematic and logical framework for analyzing how society and individuals solve such problems as what goods and services to produce, how to organize production and for whom goods and services are to be produced. Knowledge of economics is necessary for understanding and dealing intelligently with topics such as domestic and global economic development, environmental and natural resource management, renewable energy policy, international trade, government finance and market failure.

Background Information

Besides being important for understanding contemporary social issues, economics is useful in developing career skills for business, law, teaching, public administration and research. If you enjoy the challenge of understanding how the economy works and how economic concepts are used in making decisions, economics offers a stimulating and rewarding career.

The Program

The study of economics has a long tradition at North Dakota State University. A student pursuing an economics major at NDSU has the advantage of receiving instruction from a well-established and strong faculty. Economics courses are taken by students in all colleges on campus, so classes provide an opportunity to broaden one's understanding through interaction with other students.

The Department offers three tracks of economics for all economics majors: a general economics track, a quantitative economics track, and a business economics track. The general economics track offers students more flexibility in terms of economics field course selection – 18 credits of economics electives, and six credits of which may be in agricultural economics, finance, or business administration. The quantitative economics track is designed for students who desire to pursue a graduate degree in economics after college, or for students who desire a quantitative approach to economics. Students with strong quantitative and/or statistical backgrounds are highly encouraged to select the quantitative economics track. The business economics track is designed for economics students seeking business-oriented careers; it requires students to complete specific business and accounting courses offered by the College of Business.

During the freshman and sophomore years, the program requires basic college courses such as English, mathematics, science, communication and information technology. The introduction to economics includes 1) microeconomics, the study of relative prices and the consequences of different market forms, and 2) macroeconomics, the study of such topics as the general level of prices, employment and output.

Economics majors take a one-year sequence in intermediate economic theory. Students enhance their ability to explain and use fundamental microeconomics and macroeconomics concepts and are further exposed to relationships between governments and markets. These concepts and relationships establish the foundation a student needs to deal with current economic issues.

Economics students take elective courses to develop areas of emphasis such as development economics, international economics, industrial organization, public economics, health economics, natural resource economics, economics of entrepreneurship, and environmental economics. A representative program for the major in economics is summarized on the back of this page. A major in economics also can be combined with a variety of minors and other majors and still be completed in four years. The concepts of economics can be applied to many fields. A minor in economics may be selected in combination with most other majors on campus, including business.

Career Opportunities

Graduates with degrees in economics are in high demand, with economics consistently being among the top five majors wanted by employers. Business, industry, government service and teaching are some of the possible areas of employment for the economist. The study of economics also provides excellent preparation for graduate education in areas such as business, economics and law.

High School Preparation

It is recommended that high school students interested in studying economics at the university level concentrate on developing their mathematical and writing skills.

The Faculty

The economics faculty within the Department of Agribusiness and Applied Economics is student and academic oriented. The low student to faculty ratio in upper division economic courses provides close relationships and an interactive learning environment.

Financial Aid and Scholarships

A number of scholarships are available to outstanding agribusiness and applied economics majors. The College of Agriculture, Food Systems, and Natural Resources awards scholarships each year. For more information on scholarships, go to: <https://www.ndsu.edu/admission/scholarships/>.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ECON 189 ¹		1 ECON 201 (May satisfy gen ed category B)	3
COMM 110 (May satisfy gen ed category C)		3 ENGL 120 (May satisfy gen ed category C)	3
ENGL 110 (May satisfy gen ed category C)		3 Humanities & Fine Arts Gen Ed	3
TL 116 (May satisfy gen ed category S)		3 MATH 144	4
Sci & Tech Gen Ed (May satisfy gen ed category S)		3 Wellness Gen Ed	2
		13	15
Sophomore			
Fall	Credits	Spring	Credits
ECON 202 (May satisfy gen ed category B)		3 ECON 341	3
STAT 330 or 367 (May satisfy gen ed category Q)		3 STAT 331 or ECON 410	2
Social & Behavioral Science		3 Social & Behavioral Science	3
Sci & Tech w/ Lab Gen Ed (May satisfy gen ed category S)		4 Humanities & Fine Arts Gen Ed	3
Free Elective		3 Minor or Free Elective	3
		16	14
Junior			
Fall	Credits	Spring	Credits
ECON 343		3 Upper Division Writing (May satisfy gen ed category C)	3
Humanities & Fine Arts		3 Econ Elective for the Major	3
Econ Elective for the Major		3 Minor or Free Elective	3
Econ Elective for the Major		3 Minor or Free Elective	3
Minor or Free Elective		3 Free Elective	3
		15	15

Senior			
Fall	Credits	Spring	Credits
ECON 440, 461, 470, or 480 (Capstone - Select One)		3 Minor or Free Elective	3
Econ Elective for the Major		3 Free Electives	13
Minor or Free Elective		4	
Free Electives		6	
		16	16
Total Credits: 120			

- ¹ ECON 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take ECON 189

Economics

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-7441
- **Department Web Site:**
www.ag.ndsu.edu/agecon (<http://www.ag.ndsu.edu/agecon/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/economics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/economics/#planofstudytext>)

Major Requirements

Major: Economics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing [†]	
Quantitative Reasoning (R) [†]	3
Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Core Requirements for all options

Code	Title	Credits
Core Requirement		
ECON 189	Skills for Academic Success ¹	1
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
TL 116	Business Software Applications	3
Program Option: Select one of three options from below:		39-54
1) Standard, 2) Quantitative, or 3) Business Economics		
Total Credits		55-70

¹ ECON 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take ECON 189. If a student has completed another NDSU [Prefix] 189 course, this will substitute for ECON 189.

Standard Option

Students selecting the Standard Option may complete either a Bachelor of Science or a Bachelor of Arts degree.

Code	Title	Credits
Economics Electives: Select 18 credits from the list below. At least 3 of the 18 credits must be from the courses identified as "Approved as Capstone." Students may select no more than 6 credits from the list of approved non-economics courses, including ECON 324 and ECON 356, as part of the 18 credits of economics electives.		18
ECON 402	Economics of Entrepreneurship	
ECON 410	Econometrics ²	
ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (Approved as Capstone)	
ECON 461	Economic Development (Approved as Capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as Capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (Approved as Capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as Capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	

Select no more than 6 credits from the following as part of the 18 credits of economics electives:

AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 346	Applied Risk Analysis	
AGEC 347	Principles of Real Estate	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
BUSN 487	Managerial Economics	
ECON 324	Money and Banking	
ECON 356	History of Economic Thought	
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 430	Management of Financial Institutions	
FIN 440	International Finance	
FIN 450	Advanced Bank Management	
FIN 460	Corporate Finance	

Other Requirements

MATH 144	Mathematics for Business	4
STAT 330	Introductory Statistics	3
or STAT 367	Probability	
STAT 331	Regression Analysis ²	2-3
or ECON 410	Econometrics	

Additional Requirements: 9 credits of Humanities & Fine Arts and Social & Behavioral Sciences

Humanities & Fine Arts: Select 3 credits from the current general education list or any course with the prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA	3
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Social & Behavioral Sciences: Select a total of 6 credits - 3 credits must be selected from the current general education list while the remaining 3 credits may be any course with a prefix of: ANTH, CJ, GEOG, POLS, PSYC, or SOC	6
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Bachelor of Science or Bachelor of Arts Degree Requirement: A student must select either a BS or BA degree. The following requirements apply to the specific degree type selected. 3-17

Bachelor of Science: Completion of a minor program of study. This minor must be officially declared through the Office of Registration and Records. (Minimum 16 credits)

Bachelor of Arts: Completion of the BA Language Proficiency requirements and 3 credits of 300-400 level humanities, social sciences or a study abroad experience. (Credits for language proficiency will vary depending on placement; 3-14 credits)

Total Credits 39-54

² STAT 331 is waived if ECON 410 is taken.

Quantitative Economics option

Students selecting the Quantitative Economics Option complete a Bachelor of Science degree only.

Code	Title	Credits
Economics Electives: Select 9 credits from the following 400-level economics electives. At least 3 of the 9 credits must be from the courses "Approved as Capstone." Students may select no more than 3 credits from the list of approved non-economics elective courses, including ECON 324 and ECON 356, for the Standard Option as part of the 9 credits of economics electives.		9
ECON 402	Economics of Entrepreneurship	
ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (Approved as Capstone)	
ECON 461	Economic Development (Approved as Capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as Capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (Approved as Capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as Capstone)	
ECON 481	Natural Resource Economics	

ECON 482	Environmental Economics	
Other Requirements		
CSCI 122	Visual BASIC	3
or CSCI 159	Computer Science Problem Solving	
ECON 410	Econometrics	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3-4
or MATH 265	Calculus III	
or CSCI 222	Discrete Mathematics	
MATH 266	Introduction to Differential Equations	3
or STAT 368	Statistics	
or CSCI 366	Database Systems	
STAT 367	Probability	3
or STAT 467	Probability and Mathematical Statistics I	
Additional Requirements: 3 credits of Humanities & Fine Arts		3
Humanities & Fine Arts: Select 3 credits from the current general education list or any course with the prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA		
Minor in Computer Science, Mathematics or Statistics Required		10-14
This option requires the completion of either the computer science, mathematics or statistics minor. Approximately 10-14 credits for either of these minors remains after the completion of the Other Requirements for this option. The minor must be officially declared through the Office of Registration and Records.		
Total Credits		45-50

Business Economics option

Students selecting the Business Economics Option complete a Bachelor of Science degree only.

Code	Title	Credits
Economics Electives: Select 12 credits from the following. At least 3 of the 12 credits must be from the courses identified as "Approved as Capstone".		12
ECON 402	Economics of Entrepreneurship	
ECON 411	Computational Economics	
ECON 440	Game Theory and Strategy (Approved as Capstone)	
ECON 461	Economic Development (Approved as Capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as Capstone)	
ECON 472	International Trade	
ECON 475	Health Economics (Approved as Capstone)	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as Capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Other Requirements		
ECON 410	Econometrics	3
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
CSCI 122	Visual BASIC	3
Additional Electives: Select 3 credits from the following		3
BUSN 340	International Business	
BUSN 341	Global Business Environment	
ECON 472	International Trade	
FIN 440	International Finance	
MGMT 440	International Management	

MRKT 440	International Marketing	
Quantitative Tools: Select 3 credits from the following		3
ACCT 420	Accounting Information Systems	
AGEC 339	Quantitative Methods & Decision Making	
MGMT 360	Operations Management	
Additional Requirements: 3 credits of Humanities & Fine Arts		3
Humanities & Fine Arts: Select 3 credits from the current general education list or any course with the prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA		
Minor in Business Administration, Accounting or Banking Required		10
This option requires the completion of a minor in business administration, accounting or banking. Approximately 10+ credits for these minors remains after the completion of the Other Requirements for this option. The minor must be officially declared through the Office of Registration and Records.		
Total Credits		43

PROGRAM NOTES:

- Students selecting economics must complete the courses in the Core Requirement area (16 cr.) and the requirements outlined within one of the identified option areas listed below: 1] Standard Option (39-54 cr.), 2] Quantitative Economics Option (45-50 cr.), or 3] Business Economics Option (43 cr.).
- Students must earn a minimum 2.00 cumulative GPA in courses that satisfy the core requirement and option requirements.

Minor Requirements

Minor: Economics

Required Credits: 18

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
or BUSN 487	Managerial Economics	
ECON 343	Intermediate Macroeconomics	3
Elective Courses		
ECON 300-400	Elective	3
ECON 400	Elective	3
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- This minor is not available to Agricultural Economics majors.

Electrical Engineering

Department Information

- **Department Location:**
Electrical and Computer Engineering
- **Department Phone:**
701-231-7019
- **Department Email:**
info@venus.ece.ndsu.edu
- **Department Web Site:**
www.ndsu.edu/ece/ (<http://www.ndsu.edu/ece/>)
- **Credential Offered:**
B.S.E.E.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering/>)

Electrical engineers create products and services for society out of materials that exist in nature using principles of science and common sense. The profession is broad, encompassing products valued by society in many technical specialties from electric power and energy utilization to our current information age.

The Program

The Bachelor of Science degree in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, www.abet.org. It has the largest enrollment in the Dakotas. The department faculty, many of whom have years of experience in industry and teaching, give considerable attention to the individual student. Major components of the undergraduate program are basic science and mathematics, humanities and social sciences, communication, engineering science, engineering design and ethics, and both breadth and depth in electrical and computer engineering.

Areas Of Specialization

The Electrical Engineering program is designed to reflect the broad nature of the field, and students may tailor their studies within broad parameters. Students are encouraged to develop an individual program of study in close consultation with their advisers. Examples are available to illustrate how specialization may be obtained in a number of different technical areas. Students may mix and match from the examples to suit their particular interests. Technical areas include the following:

- **Biomedical Engineering** is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tool, and techniques for research diagnosis and treatment by health care professionals. Some important products are artificial hearts, medical imaging (MRI, ultrasound, CT scans), prosthetic devices, and computer aids for diagnosis. Biomedical engineers help identify the problems and needs that can be solved using engineering technology and systems methodology to provide high-quality health care at reasonable cost.
- **Communication and Signal Processing** are closely related fields within electrical engineering. Communication is the process of transferring information from one point in time and space to another point. Signal processing involves signal representation, as well as signal design and filtering. Students with this specialization find challenging opportunities worldwide to meet the need for more convenient, inexpensive, and reliable communication and signal processing.
- **Computer Engineering** involves both hardware and software for small and large computers and for all products that include dedicated computers within, such as smart phones, game consoles and automobiles.
- **Control Engineering** deals with the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, autopilots for aircraft, and robot motion control.
- **Electromagnetics** includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding and propagation.
- **Electronics and Microelectronics** deal with integrated circuits, VLSI, transistors, lasers, consumer electronics, defense electronics, power electronics, and electronic materials.
- **Nanotechnology** deals with the study of electric materials at the nanoscale level for applications such as solar cells and sensors.
- **Optical Engineering**, developed jointly with the Department of Physics, prepares future engineers in such areas as quantum theory; coherent/incoherent polarized/non-polarized light; geometric, physical, and Fourier optics; holography; and image processing and acquisition.
- **Power Systems** deals with generation, transmission, distribution and utilization of electric energy subject to safety, environmental and economic concerns.

Cooperative Education Program

The Cooperative Education Program allows students to alternate classroom study with a series of paid professional work experiences related to electrical and computer engineering. These experiences increase in complexity as the student's background increases. The program provides opportunity for pre-graduation experience in the profession, exploration of several career opportunities, money for education, an enriched degree and enhanced opportunities for employment following graduation.

High School Preparation

High school students should attempt to complete one unit of physics, four units of mathematics and one unit of chemistry.

The Facilities

The Electrical and Computer Engineering building is part of an eight building engineering complex. The building contains specialized laboratories and equipment. Numerous grants and donations from the National Science Foundation and private industry have provided valuable equipment. Laboratories along with department and university computer capabilities support education and research.

Career Opportunities

NDSU electrical engineering graduates are working all over the world in a variety of exciting jobs at excellent salaries. They work in research, design, sales, manufacturing, testing, installation, development and teaching. Many graduates find an engineering education provides excellent training for fields other than engineering such as business, medicine or law. Since engineers are problem solvers, there is a constant demand for engineers to solve problems outside typical engineering fields.

Research and Graduate Study

Departmental faculty members are currently active in several areas of research including biomedical, nanotechnology, communication and signal processing, computers, controls, electromagnetics, electronics and power engineering. Graduate studies leading to the master's and doctoral degrees are offered in the department. Further details are available in the *Graduate Bulletin*.

Selective Admission

Transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required Math must have a "C" or better before enrolling in ECE courses listed in the curriculums for Junior & Senior years."

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CHEM 121		3 ECE 111 ¹	3
Wellness Gen Ed		2 ENGL 120	3
ECE 173		4 MATH 129	3
ENGL 110		3 MATH 166	4
MATH 165		4 PHYS 251	4
		16	17
Sophomore			
Fall	Credits	Spring	Credits
EE 206		4 COMM 110	3
MATH 265		4 ECE 311	4
PHYS 252		4 MATH 266	3
ECE 275		4 Tech Elective	3
Gen Ed Science Lab		1 Humanities/Fine Arts Gen Ed	3
		17	16
Junior			
Fall	Credits	Spring	Credits
ECE 320		3 ECE 341	3
ECE 321		2 ECE 401	1
ECE 376		4 ECE 331	4
ECE 351		4 Tech Elective	3
ENGL/Upper Level Writing Gen Ed ³		3 ECE 343	4
		16	15
Senior			
Fall	Credits	Spring	Credits
ECE 403		2 ECE 405	3
ENGR 402		1 ECE Elective	3

ECE Elective	3 ECE Elective	3
Tech Elective	3 Humanities/Fine Arts Gen Ed ²	3
Social/Behavioral Sciences Gen Ed ⁴	3 Tech Elective	3
Social/Behavioral Sciences Gen Ed ⁴	3	
15		15

Total Credits: 127

- ¹ Students must take ECE 111 prior to enrolling in ECE courses listed above in the Junior and Senior year; otherwise, students must take an additional ECE Elective in lieu of ECE 111.
- ² Suggested to take ENGR 311.
- ³ Select from ENGL 320, 321, 324 or 459 to satisfy the Upper Level Writing for General Education.
- ⁴ Suggested to take either ENGR 312, ECON 105, ECON 201, or ECON 202.

PROGRAM NOTES:

ECE Elective: any didactic ECE 4xx course (not x93, 494, 496).

Tech Elective: ECE 374, any didactic ECE 4xx course, ECE x93 or 494 (max 6 credits total between x93 and 494), ECE 496 (max 3 credits), or any 33x, 35x, or 4xx level didactic ME course, or any course from accompanying list on the departmental website.

Students must earn a "C" or better in ECE 173, ECE 275, EE 206 and all required MATH courses, before enrolling in ECE courses listed above in the Junior or Senior years.

Electrical Engineering

Department Information

- **Department Location:**
Electrical and Computer Engineering
- **Department Phone:**
701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ (<http://www.ndsu.edu/ece/>)
- **Credential Offered:**
B.S.E.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering/#planofstudytext>)

Major Requirements

Major: Electrical Engineering

Degree Type: B.S.E.E.

Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing [*]	4
ECE 275	Digital Design [*]	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	3
ECE 321	Electronics II	2
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
MATH Courses Required		
MATH 129	Basic Linear Algebra [*]	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II [*]	4
MATH 265	Calculus III (w/ vectors) [*]	4
MATH 266	Introduction to Differential Equations [*]	3
Other Courses Required		
CHEM 121	General Chemistry I (May satisfy general education category S)	3
EE 206	Circuit Analysis I [*]	4
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	

ENGL 459	Researching and Writing Grants and Proposal	
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 251	University Physics I (May satisfy general education category S)	4
PHYS 252	University Physics II (May satisfy general education category S)	4
Select one of the following lab courses (May satisfy general education category S):		1
CHEM 121L	General Chemistry I Laboratory	
PHYS 251L	University Physics I Laboratory	
PHYS 252L	University Physics II Laboratory	
ECE Electives	Select 9 credits of ECE 400 level electives (excluding 494 and 496)	9
Includes the cross listed courses of ECE 427/IME 427; ECE 429/IME 429; ECE 411/PHYS 411; & ECE 411L/PHYS 411L		
Tech Electives: Select 12 credits from the following:		12
ABEN 456	Biobased Energy	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	
BIOL 315 & 315L	Genetics and Genetics Laboratory	
CE 309 & CE 310	Fluid Mechanics and Fluid Mechanics Laboratory	
CE/ME 486	Nanotechnology and Nanomaterials	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	
CHEM 364	Physical Chemistry I	
CHEM 365 & CHEM 471	Physical Chemistry II and Physical Chemistry Laboratory	
CHEM 425 & CHEM 429	Inorganic Chemistry I and Inorganic Chemistry Laboratory	
CSCI 161	Computer Science II	
CSCI 222	Discrete Mathematics	
CSCI 336	Theoretical Computer Science	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI 426	Introduction to Artificial Intelligence	
CSCI 458	Computer Graphics	
CSCI 459	Foundations of Computer Networks	
CSCI 467	Algorithm Analysis	
CSCI 474	Operating Systems Concepts	
CSCI 477	Object-Oriented Systems	
ECE 374	Computer Organization	
ECE 494	Individual Study (max. of 6 cr.)	
ECE 4XX	Any ECE 400 level didactic course	
ECE 496	Field Experience (max. of 3 cr.)	
ENGR 310	Entrepreneurship for Engineers and Scientists	
IME 440	Engineering Economy	
IME 456	Program and Project Management	
IME 461	Quality Assurance and Control	
MATH 270	Introduction to Abstract Mathematics	

MATH 420	Abstract Algebra I
MATH 421	Abstract Algebra II
MATH 429	Topics in Linear Algebra
MATH 450	Real Analysis I
MATH 451	Real Analysis II
MATH 452	Complex Analysis
MATH 480	Applied Differential Equations
MATH 481	Fourier Analysis
MATH 483	Partial Differential Equations
MATH 488	Numerical Analysis
MATH 489	Numerical Analysis II
ME 221	Engineering Mechanics I
ME 222	Engineering Mechanics II
ME 223	Mechanics of Materials
ME 350	Thermodynamics and Heat Transfer
ME 470	Renewable Energy Technology
MICR 445	Animal Cell Culture Techniques
PHYS 350	Modern Physics
PHYS 360	Modern Physics II
PHYS 413	Lasers for Scientists and Engineers
PHYS 415	Elements of Photonics
PHYS 485	Quantum Mechanics I
STAT 450	Stochastic Processes
STAT 468	Probability and Mathematical Statistics II
ZOO 460	Animal Physiology

Total Credits**104**

* No grade less than a C accepted in these courses and before enrolling in ECE 300 level courses, excluding ECE 311.

Degree Requirements and Notes

- In order to graduate, an ECE student must have at least a 2.0 GPA in all required EE and ECE courses taken at NDSU. Elective ECE courses are not included in this GPA requirement.
- Transfer Students – Transfer courses with grades less than 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major requirement.
- All Students – Students are required to attain a grade of 'C' or better in ECE 173 Introduction to Computing, ECE 275 Digital Design, EE 206 Circuit Analysis I, and all required MATH courses.

Note: For students interested in pursuing one of the areas of specialization, lists of recommendations for specific electives are available from the ECE Department (<https://www.ndsu.edu/ece/>).

Electrical Engineering and Physics

Department Information

- **Department Location:**
Electrical and Computer Engineering or South Engineering
- **Department Phone:**
7701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ or www.ndsu.edu/physics/ (<http://www.ndsu.edu/ece/> or www.ndsu.edu/physics/)
- **Credential Offered:**
B.S.E.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering-physics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/electrical-engineering-physics/>)

This double major will appeal to students with broad interests in both fundamental physical sciences and applied engineering methods. Graduates, equipped with analytical problem-solving skills and technical knowledge, will be well prepared to pursue careers in a wide range of fields within industry, government, and higher education.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
PHYS 171		1 ECE 111	3
Gen Ed Wellness		2 ENGL 120 (Will satisfy gen ed category C)	3
COMM 110 (Will satisfy gen ed category C)		3 MATH 129	3
ECE 173		4 MATH 166	4
ENGL 110 (Will satisfy gen ed category C)		3 PHYS 251 (Will satisfy gen ed category S)	4
MATH 165 (Will satisfy gen ed category R)		4 PHYS 251L (Will satisfy gen ed category S)	1
		PHYS 251R	1
		17	19
Sophomore			
Fall	Credits	Spring	Credits
EE 206		4 PHYS 370	3
MATH 265		4 ECE 311	4
ECE 275		4 MATH 266	3
PHYS 252 (Will satisfy gen ed category S)		4 PHYS 350	3
PHYS 252L (Will satisfy gen ed category S)		1 Gen Ed Humanities/Fine Arts	3
PHYS 252R		1	
		18	16
Junior			
Fall	Credits	Spring	Credits
ECE 320		3 ECE 331	4
ECE 321		2 ECE 343	4
PHYS 355		3 ECE 351	4
PHYS 360		3 ECE 376	4
PHYS 462		3 ECE 401	1
ENGL 320, 321, 324, or 459 (Will satisfy gen ed category C)		3	
		17	17
Senior			
Fall	Credits	Spring	Credits
ECE 403		2 ECE 405	3
ENGR 402		1 ECE Elective	3
PHYS 485		3 ECE Elective	3

ECE 341	3	Gen Ed Humanities/Fine Arts	3
PHYS Elective	2	Gen Ed Social & Behavioral Sciences	3
ECE/PHYS Elective	3		
Gen Ed Social & Behavioral Sciences	3		
	17		15

Total Credits: 136

Electrical Engineering & Physics

Department Information

- **Department Location:**
Electrical and Computer Engineering or South Engineering
- **Department Phone:**
701-231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ or www.ndsu.edu/physics/ (<http://www.ndsu.edu/ece/> or www.ndsu.edu/physics/)
- **Credential Offered:**
B.S.E.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/electrical-engineering-physics/#planofstudytext>)

Major Requirements

Double Major: Electrical Engineering & Physics

Degree Type: B.S.E.E.

Minimum Degree Credits to Graduate: 136

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		

Global Perspectives (G) ^{†}****Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Electrical Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	4
ECE 275	Digital Design *	4
ECE 311	Circuit Analysis II	4
ECE 320	Electronics I	3
ECE 321	Electronics II	2
ECE 331	Energy Conversion	4
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 351	Applied Electromagnetics	4
ECE 376	Embedded Systems	4
ECE 401	Design I	1
ECE 403	Design II	2
ECE 405	Design III	3
ECE Electives		
Select 6 credits of ECE 400 level electives (excluding 494 & 496).		6
Physics Core Requirements		
PHYS 171	Introductory Projects in Physics *	1
PHYS 251	University Physics I *	4
PHYS 251L	University Physics I Laboratory *	1
PHYS 251R	University Physics I Recitation *	1
PHYS 252	University Physics II *	4
PHYS 252L	University Physics II Laboratory *	1
PHYS 252R	University Physics II Recitation *	1
PHYS 350	Modern Physics *	3
PHYS 355	Classical Mechanics *	3
PHYS 360	Modern Physics II *	3
PHYS 370	Introduction to Computational Physics *	3
PHYS 462	Thermal and Statistical Physics *	3
PHYS 485	Quantum Mechanics I *	3
Select one from the following: *		3-4
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab (or ECE 411 & ECE 411L))	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
Physics Electives: Select one from the following *		3
PHYS 215	Research For Undergraduates (2 credit minimum)	
PHYS 481	Condensed Matter Physics	
PHYS 486	Quantum Mechanics II	
PHYS 489	Senior Project II	
MSUM Astronomy Courses (AST 300-400 level - with dept. permission)		

Mathematics Courses Required		
MATH 129	Basic Linear Algebra *	3
MATH 165	Calculus I *	4
MATH 166	Calculus II *	4
MATH 265	Calculus III *	4
MATH 266	Introduction to Differential Equations *	3
Other Required Courses		
EE 206	Circuit Analysis I *	4
ENGR 402	Engineering Ethics and Social Responsibility	1
Select one upper division writing course from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		114-115

* No grade less than a 'C' accepted in these courses and before enrolling in ECE 300 level courses, excluding ECE 311.

Degree Requirements and Notes:

- In order to graduate, an EE/PHYS student must have at least a 2.00 GPA in all required EE, ECE, and PHYS courses taken at NDSU. Elective ECE and PHYS courses are not included in this GPA requirement.
- Transfer Students: Transfer courses with grades less than a 'C' in Biology, Chemistry, Computer Science, Mathematics, Physics, and any type of engineering class will not be accepted as a major in this program.
- All Students: See footnote regarding a grade of 'C' required in identified courses.

Elementary Education & Human Development and Family Science Dual Degree Program

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8286
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/elementary-education-human-development-family-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/elementary-education-human-development-family-science/#planofstudytext>)

Major Requirements

Dual Degree Program

Major at NDSU: Human Development & Family Science

Major at VCSU: Elementary Education

Degree Type at: B.A. or B.S.

Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.

5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
HDFS & Elementary Education Requirements		
HDFS 230 or PSYC 250	Life Span Development (May satisfy general education category B) Developmental Psychology	3
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life (May satisfy general education category B & D)	3
HDFS 330	Child Development	3
HDFS 353	Children, Families and Public Policy	3
HDFS 390	Career Development	1
EDUC 210	Creative Activities	2
EDUC 240	Educating Exceptional Students	3
EDUC 250	Introduction to Education	3
EDUC 283	Understanding Cultural Diversity	3
EDUC 300	Educational Technology	2
EDUC 315	Math in the Elementary School	3
EDUC 320	Social Studies in the Elementary School	3
EDUC 321	Foundations of Reading Instruction	3
EDUC 322	Methods of Language Arts Instruction	3
EDUC 323	Reading in Elementary School	2
EDUC 330	Children's Literature	3
EDUC 350	Elementary School Practicum and Classroom Management (2 cr.) & HDFS 496: Field Experience (1 cr.)	3

EDUC 352	Culturally Diverse Practicum	1
EDUC 355	Science Methods/Elementary Teachers	3
EDUC 400	Educational Psychology	2
EDUC 450	Trends in Assessment & Education Issues	2
EDUC 490	Student Teaching (Elementary - 10 cr.) & HDFS 496: Field Experience (1 cr.)	11
GEOL 105 or GEOL 106	Physical Geology (May satisfy general education category S and G) The Earth Through Time	3
HIST 103 or HIST 104	U.S. to 1877 (May satisfy general education category A) U.S. Since 1877	3
MATH 104	Finite Mathematics (May satisfy general education category R)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Select one from the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS Electives: (Cannot take HDFS 230 or HDFS 496)		
HDFS	Elective	3
HDFS	300-400 level	6
Other Elementary Education Requirements		
Biology Elective		3
Chemistry or Physics Elective or STEM ED 160		3
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
GEOG 111	Survey of Geography	2
MATH 277	Math for Elementary Teachers I	3
MATH 278	Math for Elementary Teachers II	2
EDUC 491	Seminar (Senior Portfolio)	1
Total Credits		112

NDSU HDFS Degree Requirements and Notes

- A grade of C or better is required for all HDFS courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

VCSU Elementary Education Degree Requirements and Notes

- Though not required, many majors pursue a Reading or STEM credential or an endorsement in Kindergarten, Middle School, English Language Learners (ELL), or as a Special Education Strategist.
- A 2.75 cumulative GPA is required for admission to teacher education.
- A 2.5 cumulative GPA is required to begin coursework in elementary education program.
- Students will need to take Praxis CORE I sophomore year and Praxis II subject matter and pedagogy exams senior year .

Elementary Education & Human Development and Family Science

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Credential Offered:**

B.S.; B.A.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/elementary-education-human-development-family-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/elementary-education-human-development-family-science/>)

The human development and family science/elementary education dual degree program is designed to provide additional knowledge in all aspects of child development to prepare elementary teachers to be advocates for young children and extend their knowledge about how children learn, what they learn, and the techniques that facilitate such learning.

The Program

Through this curriculum, students are concurrently enrolled in the human development and family science (HDFS) major (child development option) through North Dakota State University and the elementary education major through Valley City State University (VCSU). The culmination of these requirements leads to a bachelor's degree from NDSU (human development and family science major/child development option) as well as a bachelor's degree from VCSU (elementary education major).

Under a cooperative agreement, students remain on the NDSU campus to complete all coursework for the dual degree. The courses specific to the elementary education major (VCSU) are offered on the NDSU campus by VCSU faculty. Students are certified to teach elementary education in public schools and may, with additional course work and an additional student teaching experience, be certified to teach kindergarten as well.

The HDFS degree complements and strengthens the elementary education curriculum with coursework in child development, family issues and cross-cultural diversity.

Children are very diverse in all aspects of their development—physical, cognitive, social and emotional. It is more accurate to view “normal” development as a range of possible outcomes rather than a single life course. Ultimately, these developmental factors have a strong influence on children's performance and behavior in school. A degree in HDFS will help future teachers understand development and its diversity, making them more effective teachers and helping them work with children from a wide variety of backgrounds.

Selective Admission

Admission to the dual degree program consists of two separate university applications:

1. Application for admission to NDSU for the human development and family science/elementary education dual degree prior to beginning the program, and
2. Application for admission to VCSU and admission to the teacher education program, which occurs at the end of the sophomore year.

During or immediately following the introductory professional education course, students must meet additional requirements to be admitted into teacher education:

1. Sophomore standing or better with a minimum cumulative grade point average of 2.75,
2. Satisfactory academic performance in English 110 and 120 (grades of C or higher) and successful completion of a speech screening test,
3. Achievement of minimum scores on the Pre-Professional Skills Test (PPST), and
4. Qualification for teacher certification in the state of North Dakota upon VCSU program completion, as outlined in the latest issue of the Educator's Professional Certificate Regulation booklet published by the North Dakota Department of Public Instruction.

Student Teaching

Student teaching is the culmination of the teaching program. Students have the opportunity to apply skills acquired in college courses under the supervision of an experienced educator.

Certification

Upon completing this program, students are eligible for certification to teach grades 1 through 6. The program is accredited by the National Council for Accreditation of Teacher Education.

Financial Aid and Scholarships

The Office of Financial Aid and Scholarships at NDSU makes available grants, loans, scholarships and work-study employment. Scholarships also are available through the College of Human Sciences and Education. For more information visit: <https://www.ndsu.edu/onestop/finaid/scholarships/>

The Facilities

Facilities for the dual degree program are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center. Included in these buildings are classrooms, conference rooms and a child development center serving young children and their families.

Extra-Curricular Opportunities

Students may enhance their involvement by participating in groups such as the HDFS Club, the Elementary Education Club, the North Dakota Association for the Education of Young Children, the North Dakota Family and Consumer Sciences Association and the North Dakota Education Association.

Community Setting

The Fargo-Moorhead metropolitan area offers a conducive setting for study. Students have the opportunity to work in a number of community institutions serving children and families.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
PSYC 111		3 ENGL 120	3		
HDFS 230		3 MATH 104	3		
ENGL 110		3 GEOL 105 or 106	3		
COMM 110		3 HDFS 250	3		
Science & Tech Gen Ed (BIOL)		3 HDFS 242	3		
Science lab co-requisite		1			
		16	15		
Sophomore					
Fall	Credits	Spring	Credits	Summer	Credits
HDFS 275		3 HDFS 330		3 EDUC 210: Creative Activities	2
Science: see curr guide (CHEM/PHYS/STEM ED 160)		3 HDFS 353	3		
CSCI 114 or TL 116		3 HDFS elective	3		
HIST 103 or 104		3 EDUC 240 Exceptional Students	3		
Humanities & Fine Arts Gen Ed		3 EDUC 250: Introduction to Education	3		
		MATH 277: Math for Elem 1	3		
		15	18		2
Junior					
Fall	Credits	Spring	Credits		
HDFS 300-400 level elective		3 HDFS 390 Career Development	1		
HDFS 300-400 level elective		3 EDUC 320: Social Studies Methods	3		
EDUC 300 Educ. Technology		3 EDUC 321: Foundation of Reading	3		
EDUC 283: Understanding Cult. Diversity		3 EDUC 322: Language Arts Methods	3		
EDUC 352: Culturally Diverse Practicum		1 EDUC 330: Children's Literature	3		
MATH 278: Math for Elem 2		3 EDUC 400 Educational Psychology	2		

GEOG 111	2	EDUC 450: Assessment & Education Issues	2
18		17	
Senior			
Fall	Credits	Spring	Credits
ENGL 320, 325, 358, or 459	3	HDFS 496*	1
EDUC 315: Math Methods	3	EDUC 490: Student Teaching	10
EDUC 323: Reading Methods	3		
EDUC 350: Elementary Education Practicum	2		
EDUC 355: Science Methods	3		
EDUC 491 Capstone Portfolio	1		
15		11	
Total Credits: 127			

* Students should NOT enroll themselves in HDFS 496 via Campus Connection. The NDSU Registration and Records office automatically enrolls students in the course during the student's teaching semester.

Emergency Management

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-5595
- **Department Email:**
ndsu.emgt@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/emgt/ (<http://www.ndsu.edu/emgt/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/emergency-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/emergency-management/>)

The emergency management major is available both live, in person and remote, live. This means you can complete the major in our classrooms on campus OR take our courses from wherever you live at the same time and day as the "in person" students. Our active pedagogy provides the theoretical and practical knowledge essential to the effective practice of emergency management in the public, private and non-profit sectors AND the opportunity to apply that knowledge through discussion, activity, and service learning projects. Whether in person or remote, you will be engaged, learn, and have a sense of belonging, and experience these things while focused on an important topic! Emergency management is "a managerial function charged with creating the framework within which communities reduce vulnerabilities to hazards and cope with disasters. Emergency management protects communities by coordinating and integrating all activities necessary to build, sustain, and improve the capability to mitigate against, prepare for, respond to, and recover from threatened or actual natural disasters, acts of terrorism, or other man-made disasters" (Principles of Emergency Management, 2007).

The Program

The major prepares students for success as practitioners in emergency management as well as related fields. The rigor of the major also prepares students for graduate work. The major is ideally-suited for students seeking emergency management as a career of first choice. Student career success is built upon the following four program attributes:

1. Provide an educational foundation that supports graduates' entry into different settings where emergency management is practiced (e.g., government at all levels; businesses; schools and colleges; healthcare industry; non-profit organizations; humanitarian efforts; etc.);
2. Support effective practice by providing an evidence-based focus on the research and science critical to the field;
3. Promote and foster experiential opportunities through focused class activities and required internships;

4. Develop skills necessary to the effective practice of emergency management (e.g., communication; collaboration; teamwork; leadership; critical thinking; problem-solving, etc.).

The Faculty

The Department of Emergency Management has five faculty members. Each faculty member possesses broad-based expertise in emergency management, as well as specialized expertise in their areas of practice and scholarly activity. In fact, four of the five have doctoral degrees in emergency management—a situation that exists nowhere else in the country. The diversity in faculty interests, experience and expertise create a rich environment for students to learn, build relationships, and be mentored.

Curriculum Planning

Beyond the major, students are encouraged to plan a curriculum that leverages both general education coursework and requirement to complete a minor to advance their career interests and goals. Our faculty advisors are eager to meet with students to help them develop those plans. The Department also provides an orientation guide with a list of recommended general education courses that are complimentary to the major to support student choices and other guidance to support curriculum planning.

Transfer Students

Transfer students who have completed an Associates of Arts (AA), or an Associates of Science (AS), or an Associates of Applied Sciences (AAS) degree, the minor requirements for the Bachelor of Science degree will be waived. These two instances of transfer could save a student 16-24 credits or 5 to 8 classes. In addition, the department also values the service of our military men and women, and as of Fall 2020, current and former military men and women can save up to a semester when pursuing an undergraduate degree in emergency management. If NDSU's Office of Registration and Records recognizes 15 or more credits of your military training as transferable, students do not have to complete the Bachelor of Science minor requirement.

Internship Program

An internship is required for the major. Internships are typically completed in a student's junior or senior year. The internship experience allows students to combine theoretical and applied aspects of emergency management. Internships are designed to meet each student's career goals. As such, internship opportunities are as varied as students' career goals and can include working in a variety of local, national or international settings. Internships are essential for student development and are a key factor in successful job placement.

Career Opportunities

An emergency management degree prepares students for career opportunities across all sectors, all industries and all locations. The emergency management function, while structured in a variety of ways in different government, private sector, and non-profit organizations, plays an essential role in maintaining safe and secure operations that protect the entity's interests. Career opportunities in emergency management exist at all levels of government, across all government agencies, in all developing countries; private sector companies as both a site-based and corporate function; public schools and higher education institutions; hospital and healthcare facilities; non-profit organizations as part of a primary disaster mission or general operational mission; critical infrastructure industries; museums, malls, stadiums, and event centers; and other organizations or entities that manage facilities or services subject to hazards or operational interruptions that can result in harm to individuals, property or the organization.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
EMGT 101		3 ENGL 120	3
ENGL 110		3 Gen Ed Science & Tech w/ Lab	4
Gen Ed Humanities/Fine Arts		3 Gen Ed Humanities/Fine Arts	3
Gen Ed Quantitative Reasoning		3 COMM 110	3
Gen Ed Wellness		2-3 EMGT 281	3
EMGT 222		3	
17-18		16	

Second Year					
Fall	Credits	Spring	Credits	Summer	Credits
Gen Ed Science & Tech		3 EMGT Elective		3 EMGT 496	6
AHSS Humanities - College Requirement		3 Gen Ed Science & Tech		3	
AHSS Social Sciences - College Requirement		3 AHSS Arts - College Requirement		3	
EMGT 361		3 Gen Ed Social & Behavioral Sci		3	
		EMGT 362		3	
		12		15	6
Third Year					
Fall	Credits	Spring	Credits		
Gen Ed Upper Level Writing		3 EMGT Elective		3	
Minor Course		3 EMGT Elective		3	
Minor Course		3 Minor Course		3	
Any Additional Elective or Additional EMGT Elective		3 Minor Course		3	
EMGT 364		3 Any Additional Elective or Additional EMGT Elective		3	
		15		15	
Fourth Year					
Fall	Credits	Spring	Credits		
EMGT Elective		3 EMGT 410 ^(Capstone)		3	
EMGT Elective		3 Minor Course		3	
Minor Course		3 Any Additional Electives or Additional EMGT Electives		6	
Any Additional Electives / Additional EMGT Electives		3			
		12		12	

Total Credits: 120-121

Emergency Management

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-5595
- **Department Email:**
ndsu.emgt@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/emgt/ (<http://www.ndsu.edu/emgt/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/emergency-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/emergency-management/#planofstudytext>)

Major Requirements

Major: Emergency Management

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Any EMGT prefixed course in which a grade of D or F is earned may not be used to fulfill a major requirement.

Code	Title	Credits
Emergency Management Core Courses:		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 222	Career and Professional Development	3
EMGT 281	Disaster Analysis	3
EMGT 362	Disaster Mitigation	3
EMGT 361	Disaster Preparedness	3
EMGT 363	Disaster Response	3
EMGT 364	Disaster Recovery	3
EMGT 410	Comprehensive Emergency Management Planning (Capstone)	3
EMGT 496	Field Experience	6
Emergency Management Electives: Select 5 courses from the following:		15
EMGT 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 425	World Disasters	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 445	Understanding Vulnerable Populations in Disasters	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	
EMGT 491	Seminar (Only 3 credits of seminar may allowed to count toward the major elective category. More than one seminar may be taken, however.)	
Total Credits		45

Recommended minors: Business Administration, Communication, Community Development, Criminal Justice, Environmental Science, Food Safety, Geography, Logistics Management, Political Science, Psychology, or Sociology.

Minor Requirements

Minor: Emergency Management

Minimum Required Credits: 18

Minor Requirements

Students complete one of the four options listed below for the minor.

Option One: Comprehensive Emergency Management

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3

EMGT 361	Disaster Preparedness	3
EMGT 362	Disaster Mitigation	3
EMGT 363	Disaster Response	3
EMGT 364	Disaster Recovery	3
EMGT 281	Disaster Analysis	3
Total Credits		18

Option Two: Homeland security

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 150	Dealing with Terrorism, Cybersecurity and Other Emerging Threats	3
EMGT 435	Issues in Homeland Security and Emergency Management	3
Emergency Management Elective: Select one from the following		3
EMGT 425	World Disasters	
EMGT 361	Disaster Preparedness	
EMGT 363	Disaster Response	
Expanded Electives: Select two from the following *		6
CJ 315	Federal Law Enforcement and Crime Policy	
COMM 434	Communication Law	
COMM 485	Risk and Crisis Communication	
EMGT 361	Disaster Preparedness	
EMGT 363	Disaster Response	
EMGT 425	World Disasters	
POLS 120	Terrorism	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Total Credits		18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Three: Risk and Resilience Management

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 362	Disaster Mitigation	3
EMGT 364	Disaster Recovery	3
Emergency Management Elective: Select one from the following		3
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 281	Disaster Analysis	
Expanded Electives: Select two from the following *		6
COMM 484	Organizational Advocacy and Issue Management	
COMM 487	Organizational Power and Leadership	
COMM 488	Social Influence and Organizational Change	
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 445	Understanding Vulnerable Populations in Disasters	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	
HDFS 310	Citizenship & Social Activism	
SOC 404	Community Assessment	

SOC 405	Community Development	
Total Credits		18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Option Four: Vulnerability and Capacity building

Code	Title	Credits
Emergency Management Core		
EMGT 101	Emergencies, Disasters, and Catastrophes	3
EMGT 445	Understanding Vulnerable Populations in Disasters	3
EMGT 463	Voluntary Agency Disaster Services	3
Emergency Management Electives: Select one from the following		3
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 364	Disaster Recovery	
EMGT 281	Disaster Analysis	
EMGT 362	Disaster Mitigation	
Expanded Electives: Select two from the following *		6
COMM 216	Intercultural Communication	
COMM 488	Social Influence and Organizational Change	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 361	Disaster Preparedness	
EMGT 363	Disaster Response	
EMGT 364	Disaster Recovery	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
HDFS 182	Wellness and Aging	
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
HDFS 310	Citizenship & Social Activism	
SOC 235	Cultural Diversity	
SOC 410	Social Inequality	
SOC 412	Sociology of Gender	
SOC 440	Sociology of Aging	
Total Credits		18

* Cannot count an EMGT elective core course taken toward the required 6 elective credits in this category.

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

English

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7143
- **Department Web Site:**
www.ndsu.edu/english/ (<http://www.ndsu.edu/english/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/english/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/english/>)

The English studies major offers students the flexibility to follow interests in literature, linguistics, and creative, technical, and professional writing. The curriculum joins the strengths of a traditional humanities education with the career outcomes today's students seek. English majors develop strong communication skills, multiple research strategies, flexibility in responding to complex situations, and effective project-management skills. Career success is tied to the ability to understand, restate, and analyze complex ideas and texts for multiple audiences. Such success requires habits of investigation, the ability to critically analyze sources of information, and the self-assurance to handle unfamiliar materials and situations. The department offers multiple opportunities to develop these skills both in the classroom and outside the university, while working with and for authentic clients.

The Program

The English department offers a Bachelor of Arts (B.A.) and a Bachelor of Science (B.S.) in English as well as a B.A. and a B.S. in English education. Departmental offerings include:

B.A. and B.S. in English – These degrees require 45 credits in English courses beyond first-year composition. The B.A. degree requires functional proficiency in at least one language other than English, typically 14 credits of course work in that language. The B.S. degree requires a minor. The flexibility of the single major in English studies means that students can emphasize course work in literature, linguistics, writing studies, or a balance of these.

B.A. and B.S. in English Education – These degrees require 39 credits in English courses beyond first-year composition and 34 credits in education courses. The B.A. degree requires functional proficiency in at least one language other than English, typically 14 credits of course work in that language. The B.S. degree in English education with a communication option requires 20 credits in communication courses and leads to certification in both English and speech. English education majors should contact the School of Education or the English education advisor for additional requirements.

English Minors – Minor sequences are available for literature, creative writing, and writing studies. The minors require a minimum of 21 credits in English beyond first-year composition.

Creative Writing – This minor offers students the opportunity to take seven courses in a sequence designed to develop analytic abilities, writing skills, and an understanding of the student's own creative process.

English - Literature option – This minor gives students the opportunity to read widely in literature, develop analytical skills, and hone writing skills. Courses include Literary Analysis, literature survey courses, elective literature and film courses, and one writing course.

English - Writing Studies option – This minor provides students with the opportunity to write creatively and professionally, and to explore emerging communication technologies. Courses include Introduction to Writing Studies, elective writing courses, and one upper-level literature or linguistics course.

The English Studies Major

The Department of English offers a five-course core curriculum focusing on professionalization. These courses provide every student the opportunity to: devise a career compass to guide them through their English major; to develop skills in textual analysis, and academic, professional, and civic writing; to prepare for the work world with interview skills and job packets; and to pursue an undergraduate research project that explores an authentic research question with a faculty member's guidance. In addition, this flexible degree encourages students to choose courses in areas that meet their interests and support their career goals.

Graduate Study – The Department of English offers a doctorate in Rhetoric, Writing, and Culture, and a Master of Arts degree in English.

Community/Student Involvement Opportunities

The Department of English offers many options for co-curricular activities that add value and dimension to English majors and minors. Students develop leadership and planning skills by taking part in English Club and the English Honor Society, Sigma Tau Delta. They practice spoken English with international students through Conversational English Circles, and they create and edit an annual literary magazine, *Northern Eclecta*. The department office suite includes a collaboration and creativity space for undergraduate students, where students can meet to study or work on projects, or share lunch and conversation with other majors. English classes often work with a range of local non-profits, and English majors are encouraged to pursue internships, co-ops, and field experiences, and regularly find opportunities in local industries, non-profits, and government offices.

Career Opportunities

Traditional careers in English studies, such as teaching, and professional and technical writing, are currently in high demand in our region, and the abilities to think critically, to synthesize information, and to write and speak with precision, clarity, and effectiveness are valuable in any career. Thus, many companies look for employees with English majors or minors. The demand for technical and professional writers has been growing, and many companies, non-profit organizations, and government agencies hire English majors. English majors also acquire project management skills and the ability to work as members of a team, which make them desirable employees. Former and current students are employed in writing intensive and/or training positions; some start their own businesses. Some English graduates seek professional degrees (law, library science, ministry, or medicine) or graduate degrees in English immediately after earning a B.A. or B.S.; some choose these options as career changes later in life.

High School Preparation

Beyond the core curriculum requirements necessary for admission to the University, students should have an English preparation that includes both frequent reading from most literary genres and extensive writing experience.

Scholarships

The Department of English awards more than \$8,000 in scholarships each year. English students regularly are awarded Fulbright fellowships, and participate in the university Honors Program in higher than average numbers. Contact the department for details.

- *Hal and Alice Dickey Memorial Scholarship* – awarded to a sophomore, junior, or senior.
- *Professor Ralph Engel Scholarship* – awarded to a major who has completed at least 21 credits at North Dakota State University.
- *Marjory Archer Haggart Memorial Scholarship* – awarded biennially to a sophomore or junior.
- *G. Wilson Hunter and Phyllis Krantz Hunter Scholarship* – awarded to a sophomore, junior or senior.
- *Madeline S. Gittings Endowed Scholarship* – awarded to two or three students each year.
- *Mart and Lois Vogel Award for Excellence* – awarded to one or two upper-class students.
- *Richard L. Johnson Scholarship* – awarded to a graduate student pursuing literary studies.
- *Rooney Scholarship* – awarded to a graduate student.
- *English Faculty Award* – awarded to one or two students with 15 to 45 credits.

The Faculty

The Department of English faculty is dedicated and versatile. Professors have doctorates from diverse and well-respected universities, including Connecticut, Louisville, CUNY, Kansas, Michigan, Minnesota, Washington State, Nebraska, Kentucky, and Purdue. Non-tenured faculty and staff have advanced degrees from universities such as Texas Christian, Iowa, Minnesota State, Northern Illinois, North Dakota State, and South Dakota. Faculty members publish regularly by writing books, journal articles, and book chapters; and they deliver papers at national and international professional meetings. Many faculty members have won awards for their teaching, service, research, and publications – regional, national, and international awards, as well as those from North Dakota State University.

The English department offers a gateway course, Introduction to English Studies (ENGL 167), and two general categories of courses throughout the curriculum.

Writing Studies

Introduction to Writing Studies (ENGL 275) introduces students to creative, academic, and professional writing. Students can then choose courses in these areas that meet their interests. Upper division classes offer students the opportunity to create web sites, make videos, and explore other communication technologies. Classes include the reading of literature, of scholarly and popular essays, and of professional documents in print and on the web.

Literary Studies

These classes include lively discussion of literary texts, historical periods, and contemporary issues as illuminated by, or represented in, the course material. Literary studies courses involve frequent reading and writing assignments and the opportunity to present orally. Classes include Literary Analysis (ENGL 272), survey courses, period courses, multicultural courses, interdisciplinary courses, major figures courses, genre courses, film courses and topics courses.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 200-level elective	3
ENGL 167		3 COMM 110	3
Gen Ed Quantitative Reasoning		3 Gen Ed Science & Tech	3
Minor or Free Elective		3 Gen Ed Social & Behavioral Sci	3
Gen Ed Social & Behavioral Sci		3 ENGL 120	3
		15	15

Second Year			
Fall	Credits	Spring	Credits
ENGL 275		3 ENGL 272	3
ENGL cultural diversity or 300-level		3 ENGL Cultural Diversity or 300-level	3
Gen Ed Science & Tech w/ Lab		4 Gen Ed Science & Tech	3
AHSS Area 2		3 AHSS Area 3	3
Gen Ed Wellness		2 Minor or Free Elective	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
ENGL Early Period Survey		3 ENGL 358	3
Minor or Free Elective		3 ENGL Cultural Diversity or 300-level	3
ENGL Cultural Diversity or 300-level		3 ENGL Later Period Survey	3
Minor or Free Elective		3 Minor or Free Elective	3
Minor or Free Elective		3 Minor or Free Elective	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
ENGL 467		3 ENGL 400-level	3
ENGL 400-level		3 ENGL 400-level	3
Minor or Free Elective		4 Minor or Free Elective	3
Minor or Free Elective		3 Minor or Free Elective	3
Minor or Free Elective		3 Minor or Free Elective	3
		16	15

Total Credits: 121

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
ENGL 167		3 Gen Ed Science & Tech	3
Gen Ed Quantitative Reasoning		3 Gen Ed Social & Behavioral Sci	3
Gen Ed Social & Behavioral Sci		3 ENGL 120	3
Language 101		4 Language 102	4
		16	16
Second Year			
Fall	Credits	Spring	Credits
ENGL 275		3 ENGL 272	3
ENGL cultural diversity or 300-level		3 Science & Tech	3
Gen Ed Science & Tech w/ Lab		4 AHSS Area 3	3
Gen Ed Wellness		2-3 200-level English Elective	3

Language 201		3 Language 202		3
15-16				15
Third Year				
Fall	Credits	Spring	Credits	
ENGL Early Period Survey		3 ENGL 358		3
ENGL Cultural Diversity or 300-level		3 ENGL Cultural Diversity or 300-level		3
AHSS Area 3		3 ENGL Later Period Survey		3
Free Elective		3 Free Elective		3
English Cultural Diversity or 300-level elective		3 Free Elective		3
15				15
Fourth Year				
Fall	Credits	Spring	Credits	
ENGL 467		3 ENGL 400-level		3
ENGL 400-level		3 ENGL 400-level		3
Free Elective		3 Free Elective		3
Free Elective		3 Free Elective		3
Free Elective		3 Free Elective		3
15				15
Total Credits: 122-123				

English

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-9606
- **Department Web Site:**
www.ndsu.edu/english/ (<http://www.ndsu.edu/english/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/english/#text (<http://bulletin.ndsu.edu/programs-study/undergraduate/english/#text>)

Major Requirements

Major: English

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major requirements

Students must earn a grade of 'C' or better in all courses used to fulfill requirements for the English major. These courses may only be repeated once.

Code	Title	Credits
Major Requirements		
ENGL 167	Introduction to English Studies	3
ENGL 272	Literary Analysis	3
ENGL 275	Introduction to Writing Studies	3
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 467	English Studies Capstone Experience	3
Lower Division Elective Courses - Select one of the following:		3
ENGL 209	Introduction to Linguistics	
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 229	Introduction to Creative Writing	
Literature Survey Courses - Select one of the following:		3
ENGL 240	World Literature Masterpieces	
ENGL 251	British Literature I	
ENGL 261	American Literature I	
Select one of the following:		3
ENGL 252	British Literature II	
ENGL 262	American Literature II	
Cultural Diversity Courses - Select two of the following:		6
ENGL 330	Women's Writing	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 375	The Bible as Literature	
ENGL 379	Study Tour Abroad	
ENGL 385	British Fiction	
ENGL 435	Young Adult Literature in a Multicultural World	
ENGL 453	Social and Regional Varieties of English	
ENGL 454	Language Bias	
ENGL 455	International Technical Writing	
ENGL 456	Literacy, Culture and Identity	
ENGL 474	Native American Literature	
Upper Division Elective Courses: 300-400 level courses:		
Note - AHSS 472 and AHSS 476 may be used to satisfy the 300-400 level and/or 400-level course electives below.		
ENGL	300-400 Level Courses	6
ENGL	400 Level Courses	9
Total Credits		45

Degree Notes:

- Students who major in English and declare a minor in English-Writing option or English-Studies option must have 12 unique credits in the minor that were not taken as part of the major requirements.

Minor Requirements

Minor: English

LITERATURE OPTION OR WRITING OPTION

Required Credits: 21

Required courses: literature option

Code	Title	Credits
Required Course		
ENGL 272	Literary Analysis	3
Early Period Literature Survey Course: Select one		3
ENGL 240	World Literature Masterpieces	
ENGL 251	British Literature I	
ENGL 317	American Literature I	
Later Period Literature Survey Courses: Select one		3
ENGL 252	British Literature II	
ENGL 262	American Literature II	
Minor Electives: Select 9 credits from the following:		9
200 Level Coursework (no more than 3 credits):		
ENGL 220	Introduction to Literature	
ENGL 222	Introduction to Poetry	
ENGL 225	Introduction to Film	
ENGL 231	The Bible as Literature	
300 Level Coursework:		
ENGL 330	Women's Writing	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 376	Poetry of Rock	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
ENGL 381	American Road Book	
ENGL 382	Film Genres and Styles	
ENGL 385	British Fiction	
ENGL 389	Non-fiction Prose	
400 Level Coursework (must take at least 3 credits):		
ENGL 435	Young Adult Literature in a Multicultural World	
ENGL 471	American Realistic Literature	
ENGL 472	20th Century American Writers	
ENGL 474	Native American Literature	
ENGL 476	Topics in American Literature	
ENGL 480	Medieval Literature	
ENGL 482	Renaissance Literature	
ENGL 483	Topics in British Literature	
ENGL 485	18th Century Literature	
ENGL 486	Romantic Literature	
Writing Elective: Select from the following:		3
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 423	Creative Writing Studio	
Total Credits		21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students who major in English and declare a minor in English-Literature option must have 12 unique credits in the minor that were not taken as part of the major requirements.

Required courses: writing option

Code	Title	Credits
Required Course		
ENGL 275	Introduction to Writing Studies	3
Electives: Select from the following:		15
ENGL 301	Peer Tutoring and Writing in the Disciplines	
ENGL 313	Literary Publications II	
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 413	Literary Publications III	
ENGL 423	Creative Writing Studio	
ENGL 455	International Technical Writing	
ENGL 456	Literacy, Culture and Identity	
ENGL 457	Electronic Communication	
ENGL 458	Advanced Writing Workshop	
ENGL 459	Researching and Writing Grants and Proposal	
Literature, Film or Linguistics Course: Select from the following:		3
ENGL 315	British Literature I	
ENGL 316	British Literature II	
ENGL 317	American Literature I	
ENGL 318	American Literature II	
ENGL 330	Women's Writing	
ENGL 333	Fantasy and Science Fiction	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	Contemporary American Fiction	
ENGL 345	Themes in American Culture	
ENGL 360	Grammatical Structure/English	
ENGL 377	Modern Poetry	
ENGL 380	Shakespeare	
ENGL 381	American Road Book	
ENGL 382	Film Genres and Styles	
ENGL 385	British Fiction	
ENGL 389	Non-fiction Prose	
ENGL 452	History of the English Language	
ENGL 453	Social and Regional Varieties of English	
ENGL 454	Language Bias	

Total Credits

21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students who major in English and declare a minor in English-Writing option must have 12 unique credits in the minor that were not taken as part of the major requirements.

English Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/english-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/english-education/#planofstudytext>)

Major Requirements

Major: English Education Standard Option

Degree Type: B.S. or B.A.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.

Code	Title	Credits
Teaching Specialty Requirements		
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 272	Literary Analysis	3
ENGL 251	British Literature I	3
or ENGL 252	British Literature II	
ENGL 261	American Literature I	3
or ENGL 262	American Literature II	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 360	Grammatical Structure/English	3
ENGL 380	Shakespeare	3
ENGL 435	Young Adult Literature in a Multicultural World	3
ENGL 458	Advanced Writing Workshop	3
ENGL	300-400 Literature Electives (2 courses)	6
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (English)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (English)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Modern Foreign Language (B.A.) or Minor or Second Major (B.S.)		14 or 16
A modern foreign language through the 200 level intermediate competency is required (14 cr.)		
Advisor approval needed for minor or second major (16+ cr.)		
Total Credits		87-89

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Major Requirements

Major: English Education with Communication Option

Degree Type: B.S.

Required Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

GPA of 2.75 or better in the Teaching Specialty is required for placement in student teaching and exit from the program.

Code	Title	Credits
Teaching Specialty Requirements		
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 272	Literary Analysis	3
ENGL 251	British Literature I	3
or ENGL 252	British Literature II	
ENGL 261	American Literature I	3
or ENGL 262	American Literature II	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
ENGL 360	Grammatical Structure/English	3
ENGL 380	Shakespeare	3
ENGL 435	Young Adult Literature in a Multicultural World	3
ENGL 458	Advanced Writing Workshop	3
ENGL	300-400 Literature Electives (2 courses)	6

Communication Courses		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 220	Persuasion	3
EDUC 496	Field Experience	2
Elective Courses: Select a minimum of 9 credits		9
COMM 114	Human Communication	
COMM 150	Forensic Practice	
COMM 216	Intercultural Communication	
COMM 301	Rhetorical Traditions	
COMM 310	Advanced Media Writing	
COMM 313	Editorial Processes	
COMM 318	Argumentation and Advocacy	
COMM 330	Photography for the Media	
COMM 375	Principles of Strategic Communication	
COMM 421	History of Journalism	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (English)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (English)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		93

Degree Requirements and Notes

- A grade of 'C' or better is required in all English Specialty and Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

English Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/english-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/english-education/>)

English education encompasses the four language arts of reading, writing, speaking, and listening. Accordingly, the English education major includes a broad range of English and professional education courses so that teacher candidates fully understand (a) each of the arts, (b) current theories of adolescent development, and (c) current best practices in secondary instruction. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

The Program

Candidates in the English education major are prepared to teach language arts to students in grades 5-12 with creativity and confidence. Our curriculum comprises a variety of courses in language/linguistics, composition/rhetoric, and literature. Teacher candidates in our British, American, World, and Young Adult literature courses explore fiction, poetry, and non-fiction written by men, women, and minorities. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate multiple learning styles.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced English teachers in middle or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

An academic advisor works individually with English education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

LICENSURE

Upon completing this program, teacher candidates are eligible for teacher licensure in English Language Arts in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

English teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. In addition to teaching careers, some English education graduates choose to teach English abroad or seek advanced degrees in English, law, library science, and counseling. Others obtain careers as corporate trainers or technical writers. Many options are available because an English education degree effectively teaches students to think critically, synthesize information, write and speak clearly and concisely, and to work effectively on teams.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 110		3 ENGL 120 (or elective)	3
ENGL 110 or 120		3 ENGL 240*	3
Science or Technology (Gen. Ed. elective)		3 ENGL 272	3
Wellness (Gen. Ed. elective)		2 Quantitative Reasoning (Gen. Ed. elective)	3
Language 101 (ex. FREN, SPAN)*		4 Language 102 (ex. FREN, SPAN)*	4
		15	16
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 EDUC 322	3
ENGL 209*		3 ENGL 252 or 262*	3

ENGL 251 or 261*	3	ENGL 360*	3
Science & Technology (Course/Lab pair) (Gen. Ed. elective)	4	Language 202 (ex. FREN, SPAN)*	3
Language 201 (ex. FREN, SPAN)*	3	Science & Technology (Gen. Ed. elective)	3
Prepare application materials:	Apply to the School of Education (by Feb. 15)		
Complete Core Academic Skills Exam or access your ACT+ scores			
Complete 20 hours of field experience at 5-12 grade level			
16			15
Third Year			
Fall	Credits	Spring	Credits
EDUC 451	3	EDUC 481*	3
ENGL 222*	3	EDUC 489	3
ENGL 300/400 Literature Elective	3	ENGL 358	3
Elective	3	ENGL 380*	3
Elective	2	Social/Behavioral Science (Gen. Ed. elective)	3
Social/Behavioral Science (Gen. Ed. elective)	3		
17			15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 482*	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
ENGL 300/400 Literature Elective	3	EDUC 488	3
ENGL 435*	3		
ENGL 458*	3		
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
15			13
Total Credits: 122			

* Courses with one asterisk (*) are typically offered during the specified semesters.

** Contact your advisor for more information about two additional options:

1. English Education/Communication Option
2. English Education/Second Degree Option (requires the completion of a minor or a second major).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 110		3 COMM 112 (Gen. Ed. Social/ Behavioral)	3
ENGL 110 or 120		3 COMM 220	3
Science/Technology (Course/Lab pair) (Gen. Ed. elective)		4 ENGL 120 (or elective)	3
Quantitative Reasoning (Gen. Ed. elective)		3 ENGL 240*	3
Social/Behavioral Science (Gen. Ed. elective)		3 Science/Technology (Gen. Ed. elective)	3
		16	15
Second Year			
Fall	Credits	Spring	Credits
COMM 200		3 EDUC 322	3
EDUC 321		3 ENGL 252 or 262*	3
ENGL 209*		3 ENGL 360*	3
ENGL 272		3 COMM Elective**	3
ENGL 251 or 261*		3 Global (Gen. Ed. elective)	3
Science or Technology (Gen. Ed. elective)		3 Apply to the School of Education (by Feb 15)	
Prepare application materials:			
Complete Core Academic Skills Exam or access your ACT+ scores			
Complete 20 hours of field experience at 5-12 grade level			
		18	15
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 COMM Elective**	3
EDUC 489		3 EDUC 481*	3
ENGL 222*		3 EDUC 496*	2
ENGL 300/400 Literature (elective)		3 ENGL 358	3
Cultural (Gen. Ed. elective)		3 ENGL 380*	3
Request a degree audit: http://www.ndsu.edu/ndsu/rr/forms/degreeaudit/			
Wellness (Gen. Ed. elective)		2-3	
		17-18	14
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 482*		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
ENGL 435*		3 EDUC 488	3
ENGL 458*		3	
ENGL 300/400 Literature (elective)		3	
Apply for Student Teaching			

Complete PLT (grades 7-12) Exam

Complete Subject Area Assessment
Exam

15

13

Total Credits: 123-124

* Courses with one asterisk (*) are typically offered during the specified semesters.

** COMM Electives can be selected from the following options: (9 or more credits are required) (**Minimum of 2 courses numbered above 300**)

- COMM 114: Human Communication (3 cr)
- COMM 150: Forensic Practice (**1 cr**)
- COMM 216: Intercultural Communication (3 cr)
- COMM 301: Rhetorical Traditions (3 cr)
- COMM 310: Advanced Media Writing (3 cr)
- COMM 313: Editorial Process (3 cr)
- COMM 318: Argumentation and Advocacy (3 cr)
- COMM 330: Photography for the Media (3 cr)
- COMM 362: Principles of Design for Print (3 cr)
- COMM 375: Principles of Strategic Communication (3 cr)
- COMM 421: History of Journalism (3 cr) {prereq: COMM 310}

*** Contact your advisor for more information about two additional options:

1. English Education/Standard Option (requires two years of a second language)
2. English Education/Second Degree Option (requires completion of a minor or a second major)

Entrepreneurship

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/centers/nice/ (<http://www.ndsu.edu/centers/nice/>)
- **Credential Offered:**
Minor; Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/entrepreneurship/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/entrepreneurship/>)

The entrepreneurship programs serve the needs of and is accessible to all NDSU students, regardless of major. The minor and certificate provides students with tools and capabilities that would allow them to address the intricacies of starting and managing a new venture, whether that venture be a new startup or a spin-off from an existing company.

Earning both a bachelor's degree and an entrepreneurship minor provides students with credentials demonstrating their capabilities. The certificate provides a mechanism by which individuals who may be working with a new venture or who are considering starting a new venture are able to obtain tools and capabilities to enhance their likelihood of success.

Entrepreneurship

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/centers/nice/ (<http://www.ndsu.edu/centers/nice/>)
- **Credential Offered:**

Minor; Certificate

• **Program Overview:**

bulletin.ndsu.edu/programs-study/undergraduate/entrepreneurship/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/entrepreneurship/>)

Minor Requirements

Minor: Entrepreneurship

Required Credits: 16

Code	Title	Credits
ENTR 201	Introduction to Entrepreneurship	3
or MGMT 470	Entrepreneurship/Small Business Management	
ENTR 301	Entrepreneurship Toolbox I	3
or ENGR 310	Entrepreneurship for Engineers and Scientists	
or ENTR 440	International Entrepreneurship	
or MGMT 472	Managing Family Enterprises	
ENTR 401	Entrepreneurship Capstone	3
ENTR 496	Practicum/Internship	4
Electives (choose one course):		3
ECON 402	Economics of Entrepreneurship	
MGMT 451	Negotiation and Alternative Dispute Resolution	
MRKT 430	Sales and Personal Selling	
MRKT 450	Marketing Research	
MRKT 465	Digital Marketing	
CE 483	Contracts and Specifications	
MUSC 385	Music Entrepreneurship	
IME 450	Systems Engineering and Management	
CSCI 345	Topics on Personal Computers	
Total Credits		16

Certificate Requirements

Certificate: Entrepreneurship

Required Credits: 9

Code	Title	Credits
ENTR 201	Introduction to Entrepreneurship	3
or MGMT 470	Entrepreneurship/Small Business Management	
ENTR 301	Entrepreneurship Toolbox I	3
or ENGR 310	Entrepreneurship for Engineers and Scientists	
or ENTR 440	International Entrepreneurship	
or MGMT 472	Managing Family Enterprises	
ENTR 401	Entrepreneurship Capstone	3
Total Credits		9

Environmental Design

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsua@ndsu.edu
- **Department Web Site:**

www.ndsu.edu/ala/ (<http://www.ndsu.edu/ala/>)

- **Credential Offered:**

B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-design/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-design/>)

Environmental Design is broad-spectrum profession that incorporates many disciplines. The bachelor of science in environmental design is preparation for the Master of Landscape Architecture graduate program. Students begin by completing the Bachelor of Science degree with a major in environmental design. Successful performance in the coursework leads to placement in the Master of Landscape Architecture program. A successful student may complete the undergraduate degree in years 1-4 and begin the first professional Master of Landscape Architecture degree in year 5.

Environmental Design for today and tomorrow, is a primer for architecture and landscape architecture and planning is covered in the following topics: introduction to environmental design, relationship to the environment: climate, land, water, communication with design, spatial relationships, color theories in design, form and geometries, materials and sustainability, natural materials/sustainable materials, design process, space articulation, historical relationships, social aspects of design, style and individuality, and client's concerns. How does conservation, remediation and sustainability play a role? Does technology change our thinking? How do we accommodate the world's growing population; carrying capacity beyond limits? Questions as these are explored in our educational process.

Career Opportunities

The majority of environmental designers continue on with their education to become landscape architects. Many work for landscape architecture services and firms, engineering, architecture and planning companies. Within all these job possibilities exists the opportunity to apply the ethical imperatives of conservation, remediation and sustainability to increasing challenges of energy requirements.

High School Preparation

We suggest that students take high school courses in digital drawing and animation, art, perhaps drawing from life, math and science courses such as calculus, trigonometry, physics and biology. And, if possible, we encourage high school students to take advanced placement or college credit courses that fulfill NDSU General Education requirements.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENVD 101		3 ENVD 104	1
ENVD 102		1 ENVD 172	3
ENVD 130		3 ENGL 120	3
ARCH 321		3 COMM 110	3
ENGL 110		3 ANTH 111	3
PSYC 111 or SOC 110		3 Gen Ed Quantitative Reasoning	3
		Gen Ed Wellness	2
		16	18
Second Year			
Fall	Credits	Spring	Credits
LA 231		3 LA 232	3
LA 271		6 LA 374	6
LA 321		4 Gen Ed Science & Tech	3
PLSC 355		3 Gen Ed Science & Tech	3
		Elective or Minor Requirement	3
		16	18

Third Year			
Fall	Credits	Spring	Credits
LA 331		3 LA 342	4
LA 341		4 ENGL 326 or 357	3
LA 371		6 Elective or Minor Requirement	3
Gen Ed Science & Tech with Lab		4 LA 372	6
		17	16
Fourth Year			
Fall	Credits	Spring	Credits
LA 471		6 LA 472 or ARCH 474	6
Elective or Minor Requirement		3 LA 441	4
Elective or Minor Requirement		3 LA 422	3
Elective or Minor Requirement		3	
		15	13

Total Credits: 129

Environmental Design

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsua.ala@ndsua.edu
- **Department Web Site:**
www.ndsu.edu/ala/ (<http://www.ndsu.edu/ala/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/environmental-design/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/environmental-design/>)

Major Requirements

Major: Environmental Design

Degree Type: B.S.

Minimum Degree Credits to Graduate: 130

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
ANTH 111	Introduction to Anthropology	3
ARCH 321	History and Theory of Architecture I	3
ENVD 101	Introduction to Environmental Design	3
ENVD 102	Drawing Basics for Environmental Designers	1
ENVD 104	Environmental Design Fundamentals	1
ENVD 130	Drawing Skills for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals Studio	3
LA 231	Landscape Architecture Graphics	3
LA 232	Design Technology	3
LA 271	Introduction to Landscape Architecture Studio	6
LA 272	Parks & Open Spaces Studio	6
LA 321	History of Landscape Architecture	4
LA 331	Graphics III: Design Communication	3
LA 341	Site Development and Detailing I	4
LA 342	Site Development and Detailing II	4
LA 371	Site Planning & Design Studio	6
LA 372	Community Planning & Design Studio	6
LA 422	Planting Theory and Practice	3
LA 441	Site Development and Detailing III	4
LA 471	Urban Design Studio	6
LA 472	Remediation & Planting Design Studio	6
or ARCH 474	International Design Studio	
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	
Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 326	Writing in the Design Professions	

Degree Notes:

The Bachelor of Science degree with a major in environmental design is exempt from the college minor requirement as well as the 9 credits of college area requirements.

Landscape Architecture

Department Information

- **Department Location:**
Renaissance Hall 108H
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsu.ala@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/landscapearchitecture/ (<http://www.ndsu.edu/landscapearchitecture/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/>)

Landscape architecture is a dynamic, broad-spectrum profession devoted to the design of outdoor environments. Geology, ecology and horticulture, architecture and engineering, geography, the social sciences, and the fine arts are a few of the contributors to these “architects of the land.” The function and aesthetics of parks, housing developments, transportation corridors, urban plazas, zoos, and campuses all reflect the acquired skill of landscape architects using both “hard” (built) and “soft” (planted) materials to both sustain and manipulate the natural environment.

Landscape Architecture

Department Information

- **Department Location:**
Renaissance Hall
- **Department Phone:**
701-231-6151
- **Department Email:**
ndsu.ala@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/ala/ (<http://www.ndsu.edu/ala/>)
- **Credential Offered:**
Minor
- **Plan Of Study Sample:**
bulletin.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/landscape-architecture/>)

Minor Requirements

Minor: Landscape Architecture

Required Credits: 19

Code	Title	Credits
Core Courses		
LA 231	Digital Media + Methods Technology	3
LA 271	Introduction to Landscape Architecture Studio	6
Electives: Select ten credits of the following:		10

LA 232	Design Technology
LA 272	Parks & Open Spaces Studio
LA 322	History of Landscape Architecture
LA 341	Site Design + Development
LA 342	Site Development and Detailing II
LA 441	Site Development and Detailing III

Total Credits**19**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Architecture majors may substitute 6 credits of other LA courses in the core area. A substitution form signed by the LA department chairperson will be required to submit to the Office of Registration and Records for these substitutions.
- The studio is not required for architecture majors.

Environmental Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering 201
- **Department Phone:**
701-231-7244
- **Department Web Site:**
www.ndsu.edu/cee/ (<http://www.ndsu.edu/cee/>)
- **Credential Offered:**
B.S.Env.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-engineering/>)

Would you like to make this world a better place to live by focusing on the interactions between humans and the environment? You could make a difference by choosing a career in environmental engineering. In general, environmental engineers integrate and apply biological, chemical, and engineering principles to improve and sustain the environment for the protection of its ecosystems, human health, and environmentally-related enhancement of the quality of life. The discipline focuses on water and wastewater treatment system design and public health protection; traditional and emerging contaminant mitigation in water, soil, and air; ecological principles in the design process; green manufacturing; and, sustainable design. Environmental engineers will play a crucial role in numerous 21st century challenges, including: sustainably supplying food, water, and energy; designing a future without pollution and waste; creating efficient, healthy, and resilient cities; fostering informed decisions and actions; and, curbing climate change and adapting to its impacts.[1] (p.)

The Program

Environmental engineers are professionals who have broad scientific and technical knowledge, possess strong problem-solving and design skills, and enjoy working with people. Our work is directly related to the public and environmental health and well-being, which has a significant impact on decision making and planning processes.

NDSU's B.S. in Environmental Engineering degree program, housed in the Department of Civil and Environmental Engineering, began accepting students in fall 2020. Its graduates will be sought by companies nationally at competitive salaries, and they will apply their skills in all fields of the profession domestically and abroad. The graduates will most certainly put their education to good use, bettering themselves and the world in which they live. In addition to the B.S. in Environmental Engineering, the department offers the M.S. degree in Environmental Engineering; the B.S., M.S., and Ph.D. degrees in Civil Engineering; and, participates in interdisciplinary graduate programs such as a Ph.D. degree in Materials and Nanotechnology, M.S. and Ph.D. degrees in Natural Resources Management, M.S. and Ph.D. degrees in Environmental Conservation Sciences, a Ph.D. degree in Transportation and Logistics, and M.S. and Ph.D. degrees in Biomedical Engineering.

Mission

The mission of the Department of Civil and Environmental Engineering is to:

1. Provide quality education to prepare nationally competitive undergraduate students for successful careers in civil and environmental engineering;
2. Provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of civil and environmental engineering for graduate students; and,
3. Provide service to the university, engineering profession, and the public.

Program Educational Objectives

The following program educational objectives are consistent with the university, college and department missions. Graduates of our B.S. in Environmental Engineering program are expected within a few years of graduation to:

1. Engage successfully in the practice of engineering to solve current and emerging problems.
2. Conduct design in a manner that is ethical, includes diverse perspectives, and realizes the broader societal and sustainability implications of the design and decision-making process.
3. Ascend to leadership roles within the workplace via initiative and responsible stewardship.
4. Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service.

A Flexible Curriculum

First year environmental engineering students at NDSU begin their education with fundamental courses in English, chemistry, math, introduction to environmental engineering, design and analysis methods and tools, and engineering science. Second-year courses emphasize environmental engineering fundamentals, microbiological principles, fluid mechanics, graphic communications, math and statistical analyses, and engineering science courses. During the third year, students gain exposure and knowledge in sustainable design, unit operations and processes, fate and transport of pollutants, soil mechanics, environmental chemistry, ethics, water resources, physics, and three hours of technical electives. The senior year focuses on specialized courses in air pollution, solid and hazardous waste management, water and wastewater treatment and design, hydrology, a one-year capstone senior design experience, and six hours of technical electives. The technical electives allow the student to take additional courses in those areas of environmental engineering/science in which she or he intends to practice professionally.

Faculty

The department has well-qualified and dedicated faculty members. They are nationally and internationally recognized experts, with the knowledge and experience to prepare graduates for successful careers. All faculty members in the department have a doctoral degree. All classes are taught/assessed by full-time professors, and supplemented by lectures from leaders from the industry.

Modern, Well-Equipped Facilities

The department has excellent laboratory facilities for undergraduate education and research, including the new undergraduate laboratories for water resources and environmental engineering and several state-of-the-art research laboratories.

Student Organizations

Students participate in several professional departmental student organizations, which helps them develop leadership and teamwork skills. The NDSU American Water Works Association (AWWA) and the Water Environment Federation (WEF) student chapter has won 2 national design competitions. Students may also participate in a number of student organizations within the College of Engineering, including Engineers Without Borders (EWB), Society of Women Engineers (SWE), National Society of Black Engineers (NSBE), and American Indian Science and Engineering Society (AISES).

Preparation

High school students who wish to prepare for college engineering should attempt to complete the following high school credits: one unit of physics, four units of math, and one unit of chemistry. Nationally, incoming freshmen prepared to enroll in calculus frequently complete their environmental engineering degree in four years. Students who have studied two years of pre-engineering at another institution can normally complete the environmental engineering degree in two additional years beginning with the 2022-2023 academic year.

Scholarships and Financial Aid

The Department of Civil and Environmental Engineering awards numerous scholarships each year, which range from \$500 - \$10,000. Students should check with the department for more information.

Career Opportunities

NDSU environmental engineering students will be highly sought for internships and co-ops, with most students having completed multiple work experiences. Graduates from the program will be widely regarded as hands-on, can-do, project-ready professionals, who will be very successful in finding excellent jobs. Most students will have selected a job before graduation and others within a few weeks of graduation. The work varies in regard to the type of activity and location. Environmental engineers can work in the office, in the field, or a combination of the two. They can work primarily with a number of intricate designs or with people in management or sales. Environmental engineering graduates normally go to work at consulting

firms, governmental (state and federal) agencies, NGOs, or industry. The academic curriculum also prepares environmental engineering graduates for graduate school, law school, and/or an MBA program.

Since this degree program began in fall 2020, there job placement data is not currently available.

[1] (p.) National Academies of Sciences, Engineering, and Medicine. 2019. Environmental Engineering for the 21st Century: Addressing Grand Challenges. Washington, DC: The National Academies Press. doi: <https://doi.org/10.17226/25121>.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENVE 111		1 ENVE 211	1
CHEM 121		3 CHEM 122	3
CHEM 121L		1 CHEM 122L	1
ENGL 110		3 COMM 110	3
ENGL 120		3 MATH 166	4
MATH 165		4 ME 221	3
		Gen Ed Humanities (A)	3
		15	18
Sophomore			
Fall	Credits	Spring	Credits
ENVE 250		3 ENVE 350	3
CE 212		3 CE 309	3
CHEM 240		3 IME 460	3
GEOL 105		3 MATH 266	3
MATH 259		3 MATH 128	1
ME 222		3 ME 223	3
		Gen Ed Wellness (W)	2
		18	18
Junior			
Fall	Credits	Spring	Credits
ENVE 360		3 ENVE 412	2
ENVE 370		3 ENVE 450	1
CE 310		1 ENVE 460	3
CE 316		3 CE 408	3
ENGL 321		3 ENGR 311 (Fulfills Gen Ed (A))	3
PHYS 252		4 ENGR 402	1
		Technical Elective	3
		17	16
Senior			
Fall	Credits	Spring	Credits
ENVE 488		2 ENVE 489	2
CE 410		3 CE 472	3

CE 477	3	CE 473	3
IME 440	2	ENGR 312 (Fulfills Gen Ed (B))	3
Technical Elective	3	Technical Elective	3
Gen Ed Social & Behavioral Sci (B)	3		
	16		14

Total Credits: 132

Environmental Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering 201
- **Department Phone:**
701-231-7244
- **Department Web Site:**
www.ndsu.edu/ce/ (<http://www.ndsu.edu/ce/>)
- **Credential Offered:**
B.S.Env.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/environmental-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/environmental-engineering/#planofstudytext>)

Major Requirements

Major: Environmental Engineering

Degree Type: B.S.Env.E.

Minimum Credits Required for Degree: 132

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		

Global Perspectives (G) ^{†}****Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Environmental Engineering Requirements

Code	Title	Credits
Core Courses		
CE 212	Civil Engineering Graphic Communications	3
CE 309	Fluid Mechanics	3
CE 310	Fluid Mechanics Laboratory	1
CE 316	Soil Mechanics	3
CE 408	Water Resources and Supply	3
CE 410	Water and Wastewater Engineering	3
CE 472	Solid Waste Management	3
CE 473	Air Pollution	3
CE 477	Applied Hydrology	3
ENVE 111	Introduction to Environmental Engineering	1
ENVE 211	Analysis and Design Methods for Environmental Engineers	1
ENVE 250	Fundamentals of Environmental Engineering	3
ENVE 350	Microbiological Principles for Environmental Engineers	3
ENVE 360	Environmental Chemistry for Water and Wastewater	3
ENVE 370	Sustainability Engineering	3
ENVE 412	Unit Operations and Processes	2
ENVE 450	Environmental Engineering Chemistry Laboratory	1
ENVE 460	Environmental Fate and Transport	3
ENVE 488	Senior Design I	2
ENVE 489	Senior Design II	2
Required MATH Courses		
MATH 128	Introduction to Linear Algebra (*)	1
MATH 165	Calculus I (Gen Ed Category R) *	4
MATH 166	Calculus II *	4
MATH 259	Multivariate Calculus *	3
MATH 266	Introduction to Differential Equations *	3
Other Required Courses		
CHEM 121	General Chemistry I (Gen Ed Category S)	3
CHEM 121L	General Chemistry I Laboratory (Gen Ed Category S/Lab)	1
CHEM 122	General Chemistry II (Gen Ed Category S)	3
CHEM 122L	General Chemistry II Laboratory (Gen Ed Category S/Lab)	1
CHEM 240	Survey of Organic Chemistry	3
ENGL 321	Writing in the Technical Professions (Gen Ed Category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
ENGR 311	History of Technology in America (Gen Ed Category A)	3
ENGR 312	Impact of Technology on Society (Gen Ed Category B)	3
GEOG 105	Fundamentals of Geographic Information Systems (Gen Ed Category S & G)	3
IME 440	Engineering Economy	2
IME 460	Evaluation of Engineering Data	3
ME 221	Engineering Mechanics I *	3

ME 222	Engineering Mechanics II *	3
ME 223	Mechanics of Materials *	3
PHYS 252	University Physics II	4
Technical Electives (Students must take 9 credits from Categories One/Two)		
Category One Technical Electives (select a minimum of 6 credits)		6
CE 417	Slope Stability and Retaining Walls	
CE 421	Open Channel Flow	
CE 462	Designing with Geosynthetics	
CE 471	Environmental Nanotechnology	
CE 474	Groundwater Sustainability Design	
CE 476	Watershed Modeling	
CE 478	Water Quality Management	
CE 479	Advanced Water and Wastewater Treatment	
CE 491	Seminar (Small Community Water Supply and Sanitation)	
CE 494	Individual Study (Environmental Engineering Design)	
Category Two Technical Electives (select a maximum of 3 credits)		3
BIOL 470	Freshwater Ecology and Limnology ¹	
BIOL 480	Ecotoxicology ¹	
BIOL 481	Wetland Science ¹	
CE 486	Nanotechnology and Nanomaterials	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems ¹	
GEOG 465	Remote Sensing of the Environment	
RNG 452	Managing Natural and Rangeland Resources using GIS	
or NRM 452	Geographic Information Systems in Range Survey	
RNG 454	Wetland Resources Management ^{1/2}	
or NRM 454	Wetland Resources Management	
Total Credits		115

* No grades less than a "C" are accepted in any of the math courses, as well as ME 221 (<https://bulletin.ndsu.edu/search/?P=ME%20221>) Engineering Mechanics I, ME 222 (<https://bulletin.ndsu.edu/search/?P=ME%20222>) Engineering Mechanics II, and ME 223 (<https://bulletin.ndsu.edu/search/?P=ME%20223>) Mechanics of Materials for this curriculum.

¹ This course has a pre-requisite that may need to be satisfied.

² This course requires the approval of the offering department prior to enrolling.

Degree Requirements And Notes:

- Transfer students are required to take ENGR 311 (<https://bulletin.ndsu.edu/search/?P=ENGR%20311>) History of Technology in America or ENGR 312 (<https://bulletin.ndsu.edu/search/?P=ENGR%20312>) Impact of Technology on Society regardless of General Education completion.

Environmental Geology

Department Information

- **Department Location:**
Geosciences Building
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-geology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/environmental-geology/>)

As environmental stewardship becomes an increasingly important aspect of all career paths, the "Environmental Geology" minor complements and enhances a wide range of majors. Students interested in the Earth and the environment are invited to consider this rewarding and challenging minor.

The "Environmental Geology" minor is open to undergraduate students within all majors (except full Geology majors). The curriculum requires 19 - 20 semester hours. Note that some of the courses also have chemistry and math prerequisites.

Environmental Geology

Department Information

- **Department Location:**
Geosciences Building
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/environmental-geology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/environmental-geology/>)

Minor Requirements

Minor: Environmental Geology

Required Credits: 19

Code	Title	Credits
Required Courses		
GEOL 105	Physical Geology	3
GEOL 105L	Physical Geology Lab	1
GEOL 300	Environmental Geology	3
GEOL 412	Geomorphology	3
GEOL 414	Hydrogeology	3
GEOL 428	Geochemistry	3
Select one from the following:		3 or 4
GEOL 413	Glacial Geology	
GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	
Total Credits		19-20

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- This minor is not available to students pursuing a Geology major.

Equine Science

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.equinescience@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/equinescience/ (<http://www.ag.ndsu.edu/equinescience/>)
- **Credential Offered:**

B.S.

• **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/equine-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/equine-science/>)

EQUINE SCIENCE

The depth and reach of the U.S. equine industry is far greater than many people realize. There are 7.2 million horses in the United States and the industry contributes \$122 billion to the gross domestic product. Over 1.3 million people own horses, and an additional 38 million people who don't own horses identify as a horse enthusiast. Careers in the U.S. horse industry support the equivalent of approximately 454,000 full-time jobs working directly with horses and 988,000 indirect jobs that provide support to the equine industry.

THE PROGRAM

The Equine Science program provides a well-rounded, science-based education encompassing both classroom and experiential learning opportunities. For individuals interested in pursuing their education beyond a Bachelor of Science degree, the Equine Science curriculum can be tailored to meet the requirements for veterinary schools and graduate programs.

THE CURRICULUM

The Equine Science major is designed to provide a strong overall background with supporting course work in the sciences, humanities and general education. Classes include anatomy, physiology, nutrition, health, production management, horsemanship and equitation. Hands-on learning opportunities are a priority with 70% of the equine courses providing students this type of experience. The curriculum requires students to complete an internship, study abroad or research experience. These unique opportunities allow students to put what they learn into practice, and offers the chance to gain valuable experiential education in the horse industry.

An Equine Science minor through North Dakota State University allows students to explore several equine-related courses and gain general horse industry knowledge. Students can also receive a minor in Equine Assisted Activities & Therapies which focuses on coursework in equine science, human development, and psychology. Both minors pair well with essentially any major offered at NDSU.

THE FACULTY

The Equine Science Program has outstanding faculty members with diverse backgrounds in the equine industry who are ready to help students learn and thrive at NDSU. Our faculty have taught internationally, earned multiple teaching and advising awards, and maintain active research programs.

Equine Science faculty expertise is complemented by other faculty within the Department of Animal Sciences and across the university. The overall quality of the faculty at North Dakota State University has been recognized through numerous awards for teaching and research excellence.

CAREER OPPORTUNITIES

Our graduates find exciting careers in diverse areas including sales representatives for nutrition, pharmaceutical and equipment products; marketing specialists; barn and facility managers; equine event and show managers; working with breed and industry associations; equine reproduction; horse training and sales preparation; and riding instructors. In addition to career opportunities following graduation, many students have chosen to continue their education in veterinary schools or graduate programs.

EXTRA-CURRICULAR ACTIVITIES

The NDSU Horsemen's Association supports a variety of equine-related activities. The club supports the Intercollegiate Horse Show teams, sponsors a western IHSA show, and conducts several youth camps.

The NDSU Rodeo Club provides students the opportunity to gain experience and knowledge of the sport of rodeo. The club supports the Intercollegiate Rodeo Team and also sponsors the Bison Stampede Rodeo each fall.

FINANCIAL AID AND SCHOLARSHIPS

Part-time work and work-study programs are available at the equine center, in several different livestock units, and in animal science laboratories within the department. Over \$50,000 in departmental scholarships are awarded to Equine Science, Animal Science and Veterinary Technology students annually. In addition, the College of Agriculture, Food Systems, and Natural Resources awards scholarships each year to incoming freshman and current NDSU students. Contact the Office of the Dean, College of Agriculture, Food Systems, and Natural Resources, for more information on college scholarships <https://www.ag.ndsu.edu/academics/scholarships> (<https://www.ag.ndsu.edu/academics/scholarships>)

Student loan, grant and work-study information is available from the Office of Financial Aid and Scholarships, and One Stop <https://www.ndsu.edu/onestop/finaid/>

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ANSC 101		1 ANSC 223	2
ANSC 218		3 BIOL 111	3
ANSC 260		2 COMM 110	3
MATH 103		3 BIOL 100L	1
ENGL 110		3 ENGL 120	3
Social/Behavioral Science and Cultural Diversity		3 Humanities/Fine Arts	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
AGEC 242		3 AGECE 244	3
ANSC 235		2 MICR 202	2
ANSC 261		1 MICR 202L	1
CHEM 117		3 STAT 330	3
CHEM 117L		1 ECON 201	3
ANSC 260L		1 Humanities/Fine Arts	3
Elective		3	
		14	15
Third Year			
Fall	Credits	Spring	Credits
ANSC 360		3 ANSC 364	3
PLSC 315		3 ANSC 358	2
ENGL 32X Upper-level Writing		3 BIOC 260	4
NRM/PLSC/RNG Any level course		3 ANSC 371	3
ANSC Elective		3 Elective	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
ANSC 393/396 Internship/Research		2 ANSC 480	3
ANSC Elective		6 ANSC 478	3
Elective		6 ANSC 463	3
Wellness		2 ANSC 463L	1
		Elective	5
		16	15

Total Credits: 120

Equine Science

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/equine-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/equine-science/#planofstudytext>)

Major Requirements

Major: Equine Science

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Required Core Courses for Equine Science		
ANSC 223	Introduction to Animal Nutrition	2
ANSC 235	Equine Evaluation	2
ANSC 260	Introduction to Equine Studies	2
ANSC 260L	Equine Care and Management Practicum	1
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 357	Animal Genetics	3
or ANSC 358	Equine Genetics	
ANSC 360	Equine Nutrition	3
ANSC 364	Equine Anatomy and Physiology	3
ANSC 370	Fundamentals/Animal Disease	3
or ANSC 371	Fundamentals of Animal Disease II	
ANSC 480	Equine Industry and Production Systems	3
ANSC 478	Research and Issues in Animal Agriculture	3
ANSC 393	Undergraduate Research	2
or ANSC 396	Field Experience	
ANSC 463	Physiology of Reproduction	3
ANSC 463L	Physiology of Reproduction Laboratory	1
Animal Science Electives	Select 9 credits of ANSC prefix courses	9
Select one of the following:		1
ANSC 101	Student Success Techniques - Animal and Equine Science	
ANSC 102	Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis	
ANSC 201	Student Success Techniques - Nontraditional & Transfer Students	
VETS 150	Introduction to the Veterinary Profession	
Select one pair from the following:		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
Select one of the following:		3
MATH 103	College Algebra	
MATH 105	Trigonometry	
MATH 107	Precalculus	
MATH 146	Applied Calculus I	
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
BIOC 260	Elements of Biochemistry	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy general education category S)	4
ECON 201	Principles of Microeconomics (May satisfy general education category B)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
PLSC 315	Genetics (May satisfy general education category S)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Choose from any level PLSC, NRM, or RNG		3
Total Credits		81

Degree Requirements and Notes:

- Students must earn at least a 2.00 GPA that is based on the courses that are used to satisfy major requirements.
- Transfer grades of 'C' or better to count towards major requirements.

Minor Requirements

Minor: Equine Science

Required Credits: 16

Minor Requirements

Code	Title	Credits
Required Courses		
ANSC 223	Introduction to Animal Nutrition	2
ANSC 260	Introduction to Equine Studies	2
ANSC 260L or ANSC 261	Equine Care and Management Practicum Basic Equitation & Horsemanship	1
ANSC 360 or ANSC 364	Equine Nutrition * Equine Anatomy and Physiology	3
Elective Courses: Select a minimum of 8 credits from the following:		8
ANSC 235	Equine Evaluation	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 357 or ANSC 358	Animal Genetics Equine Genetics	
ANSC 360	Equine Nutrition *	
ANSC 361	Intermediate Horsemanship	
ANSC 362	Colts in Training	
ANSC 364	Equine Anatomy and Physiology *	
ANSC 371	Fundamentals of Animal Disease II	
ANSC 461	Advanced Horsemanship and Equitation	
ANSC 463	Physiology of Reproduction	
ANSC 480	Equine Industry and Production Systems	
ANSC 496	Field Experience	

* If both courses are completed successfully, the second course will apply towards Elective Courses category.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Equine Assisted Activities and Therapies

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
Minor
- **Program Overview:**

bulletin.ndsu.edu/programs-study/undergraduate/equine-assisted-activities-therapies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/equine-assisted-activities-therapies/>)

Minor Requirements

Minor: Equine Assisted Activities and Therapies

Required Credits: 18

Code	Title	Credits
Required Courses		
ANSC 210	Introduction to Therapeutic Horsemanship	3
ANSC 260L	Equine Care and Management Practicum	1
ANSC 260	Introduction to Equine Studies	2
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 361	Intermediate Horsemanship	1
ANSC 310	Principles of Therapeutic Horsemanship Instruction	3
ANSC 410	Therapeutic Horsemanship Teaching Practicum	1
Electives: Select 6 credits from the following (Please note some courses below require a prerequisite that may not be listed):		6
HDFS 230	Life Span Development	
HDFS 320	Prenatal, Infant and Toddler Development	
HDFS 330	Child Development	
HDFS 340	Adolescent Development	
HDFS 360	Adult Development and Aging	
PSYC 211	Introduction To Behavior Modification	
PSYC 212	Psychological Aspects of Drug Use and Abuse	
PSYC 214	Social Interaction	
PSYC 250	Developmental Psychology	
PSYC 270	Abnormal Psychology	
BIOL 220	Human Anatomy and Physiology I	
BIOL 221	Human Anatomy and Physiology II	
First Aid & CPR Certification *		0
American Heart Association or American Red Cross First Aid and CPR Certification		
Total Credits		18

* Students must earn their First Aid and CPR certification and present their current cards to the department of Animal Science for verification of this certification. Once verified by the department, the department will submit a waiver form to the Office of Registration and Records as proof of certification completion.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a 2.0 minimum GPA for the minor requirements.

Equine Assisted Activities & Therapies

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
Minor

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/equine-assisted-activities-therapies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/equine-assisted-activities-therapies/>)

The Equine Assisted Activities & Therapies (EAAT) minor offers students from any major who possess basic horsemanship skills an opportunity to pursue their therapeutic riding instructor or equine specialist certification. This 18-credit experiential learning program focuses on concepts and theories in the EAAT field, equine management, human development, precautions and contraindications of disabilities, and application of the skills needed to become a therapeutic riding instructor or equine specialist.

Exercise Science

Department Information

- **Department Location:**

Bentson/Bunker Field House

- **Department Phone:**

701-231-7484

- **Department Web Site:**

www.ndsu.edu/hnes/ (<http://www.ndsu.edu/hnes/>)

- **Credential Offered:**

B.S.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/exercise-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/exercise-science/#planofstudytext>)

Major Requirements

Major: Exercise Science

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		

Global Perspectives (G) ^{†}****Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Exercise Science Requirements		
BIOL 220 & 220L	Human Anatomy and Physiology I	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 121 & 121L	General Chemistry I	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
HNES 170	Introduction to Exercise Science *	2
HNES 250	Nutrition Science (May satisfy general education category W)	3
HNES 365	Kinesiology	3
HNES 368	Biomechanics of Exercise	3
HNES 370	Exercise and Disease	3
HNES 371	Worksite Health Promotion	3
HNES 374	Methods in Resistance Training and Cardiovascular Conditioning	3
HNES 375	Research Methods and Design in Exercise Science	3
HNES 465	Physiology Of Exercise	3
HNES 466	Physiology Exercise Laboratory	1
HNES 472	Exercise Assessment and Prescription	3
HNES 475	Exercise Science Internship	12
HNES 476	Exercise Testing Laboratory	2
HNES 491	Seminar	1
HNES 496	Field Experience	1
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
PSYC 211	Introduction To Behavior Modification (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		78

* Requires a grade of 'B' or better.

Degree Requirements and Notes

- A cumulative GPA of 3.00 is required for graduation. No grades of 'D' or 'F' may be used to satisfy Exercise Science major courses.
- With the exception of field experiences, seminar, and internship, courses under the Exercise Science requirements may not be taken Pass/Fail.
- Department Requirements:BIOL 220 Human Anatomy and Physiology I, BIOL 220L Human Anatomy and Physiology I Laboratory, CHEM 121 General Chemistry I, PSYC 111 Introduction to Psychology and PSYC 211 Introduction To Behavior Modification, and HNES 250 Nutrition Science are listed within the General Education categories of Science & Technology, Social & Behavioral Sciences, and Wellness.

Exercise Science

Department Information

- **Department Location:**
Bentson Bunker Fieldhouse
- **Department Phone:**
701-231-6385
- **Department Web Site:**
www.ndsu.edu/hnes/exercise_science/ (http://www.ndsu.edu/hnes/exercise_science/)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/exercise-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/exercise-science/>)

Large corporations, hospitals, colleges, small businesses, resorts and hotels are incorporating more health promotion services than ever before. The exercise science (ES) major at North Dakota State University prepares students to meet this growing demand. The exercise science major is accredited by the Commission on Accreditation of Allied Health Education Programs through the American College of Sports Medicine (ACSM). This curriculum covers the knowledge, skills and abilities expected of an ACSM Certified Exercise Physiologist.

Exercise Science Major

The ES major is designed to prepare students for entry-level positions in any of the four health-fitness settings: commercial, community, corporate or clinical. Completion of the ES major may act as a stepping stone to prepare the exceptional student for graduate education in exercise physiology/science, cardiac rehabilitation, physical therapy, sports nutrition, sports medicine, biomechanics or other allied health disciplines.

The ES major includes everything from the study of physical activity and the associated acute and chronic physiological responses and adaptations resulting from it, to health-fitness business management principles found in facilities worldwide. Students are strongly encouraged to select a minor in business or other appropriate area depending on their interests. Several field experience courses during the four-year program, as well as a capstone experience involving a semester-long internship required at the end of the ES major, afford students the opportunity to select an area of specialization in the field at sites available throughout the country.

Career Options

The following list is not all-inclusive, but does identify some of the most common career and job opportunities in the four health-fitness settings. Exercise science graduates from NDSU (approximately 40 to 50 per year) are employed in these different settings across the country, especially in metropolitan areas. In the past few years, over 90% of exercise science students have either been enrolled in graduate school or have a professional job arranged at the time of graduation.

Commercial Setting – The greatest proportion of jobs can be found in for-profit, commercially run health-fitness facilities. The commercial environment is for someone interested in the marketing and sales of health-fitness services and products. This is also a good place for broad exposure to management in the health-fitness industry.

Community Setting – Many organizations and agencies serve clients in community settings, including voluntary, not-for-profit entities, as well as public parks and recreation agencies, schools and universities, hotels, country clubs and residential health-fitness developments. Many community-based facilities and programs offer exposure to health-fitness programming coupled with a social and recreational focus.

Corporate Setting – In-house health-fitness facilities and services found in large and small-scale businesses are expanding rapidly. The objectives of these facilities may include reductions in employee absenteeism, turnover rates and health care costs, while improving employee wellness, morale and enthusiasm in the workplace.

Clinical Setting – Hospital-based health-fitness facilities can be found in one out of every four hospitals, with a forecasted growth to almost one out of every two hospitals expected within the next decade. Most of these facilities are closely associated with outpatient services, such as physical therapy, sports medicine and cardiac rehabilitation, and frequently provide both types of programs in the same facility.

With an undergraduate degree and no experience, a starting salary averages \$38,000 to \$48,000 per year. However, the starting salary for health-fitness professionals is difficult to predict because of such factors as experience, geographic location, employment setting and market demand. It also may depend on licensure and certification. An advanced degree may pay more.

Pre-Professional and Professional Tracks

Admission to the pre-professional emphasis in ES occurs when the student applies to NDSU and declares an ES major. The pre-professional emphasis encompasses the first three semesters; transfer students are placed in the pre-professional emphasis upon acceptance. Entrance into

the professional emphasis occurs through application at the end of the first semester of sophomore year or as transfer students complete the requirements below. The following requirements must be met before beginning the professional course of study:

1. Successful completion of courses with a grade of B or better:
 - a. BIOL 220/220 L
 - b. CHEM 121/121L
 - c. HNES 170
 - d. MATH 103,104 or higher
2. Minimum grade point average of 3.0
3. Completion of application to professional emphasis

Application guidelines are provided during classes (HNES 170) and advising sessions, and are also available on the department website.

High School Preparation

While in high school, a student should choose courses that provide a solid background in science, mathematics, business and communication. Individual commitment to lifetime fitness and personal health and well-being is very important. Volunteer work at a health-fitness facility and participation in local health fairs may provide valuable experiences in health-fitness programming.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 or 120 ^{Placement applies.}		3 COMM 110	3
HNES 170		2 CSCI 114 or TL 116	3
PSYC 111		3 Humanities/Global	3
Electives		6 Electives	6
		14	15
Sophomore			
Fall	Credits	Spring	Credits
** See note below		BIOL 221	3
BIOL 220		3 BIOL 221L	1
BIOL 220L		1 CHEM 122	3
CHEM 121 (pre or co-requisite: MATH 103)		3 CHEM 122L	1
CHEM 121L		1 HNES 365	3
PHYS 211 (pre-requisite: MATH 105)		3 STAT 330	3
PHYS 211L		1 Electives	3
HNES 250		3	
		15	17
Junior			
Fall	Credits	Spring	Credits
PSYC 211		3 HNES 368	3
HNES 374		3 HNES 370	3
HNES 375		3 HNES 371	3
HNES 465		3 HNES 491	1
HNES 466		1 Humanities/Diversity	3
Elective		2 Electives	3
		15	16

Senior			
Fall	Credits	Spring	Credits
Upper Division Writing		3 HNES 475	12
HNES 472		3	
HNES 476		2	
HNES 496		1	
Electives		7	
16			12
Total Credits: 120			

- ** Students apply for Exercise Science Professional Status during fall semester of sophomore year. Application guidelines are provided during HNES 170 Introduction to Exercise Science and during advising sessions with freshmen, as well as on the Exercise Science (https://www.ndsu.edu/hnes/exercise_science/) web site. The following requirements must be met before beginning the professional course (sophomore, junior and senior level courses with prefix HNES) of study:
1. Successful completion of HNES 170 Introduction to Exercise Science with a grade of 'B' or better
 2. Successful completion of BIOL 220 Human Anatomy and Physiology I/BIOL 220L Human Anatomy and Physiology I Laboratory with a grade of 'B' or better
 3. Successful completion of MATH 103 College Algebra or MATH 104 Finite Mathematics or higher with a grade of 'B' or better
 4. Successful completion of CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory with a grade of 'B' or better
 5. Minimum NDSU cumulative GPA of 3.00 or higher

† Consult your advisor for suggested electives for certain Graduate and Professional programs.

Extension Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/extension-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/extension-education/>)

The Extension Education minor provides educational background and presentation skills for individuals who seek careers associated with the Cooperative Extension Service. This minor is offered in conjunction with agricultural education and family and consumer sciences education programs in the School of Education. The minor is appropriate for many majors across the university including human development and family science as well as majors within the College of Agriculture, Food Systems, and Natural Resources.

Extension Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
Minor

Minor Requirements

Minor: Extension Education

Required Credits: 16-17

Code	Title	Credits
Required Courses		
H&CE 446	Extension Education (Required)	2
EDUC 322	Educational Psychology	3
or HDFS 230	Life Span Development	
NRM 421	Environmental Outreach Methods ^(H&CE 481 limited to Ag Ed majors only)	3
or H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	
or H&CE 481	Methods of Teaching Agriculture	
Select one from the following:		3
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education	
HDFS 462	Methods of Family Life Education	
ENGL 459	Researching and Writing Grants and Proposal	
PLSC 312	Expanding the Boundaries of Learning with Service	
H&CE 496	Field Experience (Internship) *	5-6
Total Credits		16-17

* Additional Field Experience credit may be warranted if additional time in the internship experience is required.

Minor Requirements and Notes

Coursework within the Extension Minor should total at least 11 credit hours, internship will fulfill the balance of minor credit hours

A minimum of 8 credits must be taken at NDSU.

Discuss options of courses with either Dr. Mari Borr or Dr. Adam Marx depending upon your intended Extension direction.

Family and Consumer Sciences Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/ted/ (<http://www.ndsu.edu/ted/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/family-consumer-sciences-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/family-consumer-sciences-education/>)

The Program

Candidates in the family and consumer sciences education major are prepared to guide a variety of teaching and learning experiences for students in grades 5-12, in occupational or non-occupational programs, adult programs, or to serve as an extension educator. Hands-on experience is provided throughout the program to develop the teaching skills learned in classes. Courses from all areas of family and consumer sciences including individuals and families, nutrition and wellness, apparel, and consumer decision making are included in the program. This contributes to the versatility of the major since the broad range of knowledge may be applied to a wide variety of settings as an educator and/or a family and consumer scientist.

professional education courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75

grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates have the opportunity to apply knowledge and skills acquired in college courses to real-world classrooms under the supervision of an experienced family and consumer sciences educator in middle and secondary classrooms. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

An academic advisor works individually with family and consumer sciences teacher candidates to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in family and consumer sciences in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education and Standards Practices Board (ESPB). North Dakota State University is designated by the State Board of Career and Technical Education as the recognized institution for preparing teachers of family and consumer sciences education.

Career Opportunities

Graduates pursuing a career in teaching become employed in both traditional and nontraditional teaching situations. Settings include teaching in middle and secondary schools and vocational centers. Other career options include employment as consultants in teaching family and consumer sciences at the elementary school level or serving as family and consumer sciences teachers for special education students. Teachers of adult programs work with various agencies and local school districts offering adult enrichment, continuing education, evening and summer classes, and programs for special groups such as parents, senior citizens and migrant workers. Graduates also are employed by the Cooperative Extension Service, utility companies, health and human service agencies and retail establishments.

Financial Aid and Scholarships

Information about various loans, grants, general scholarships and employment is available through the Office of Financial Aid and Scholarships or One Stop. Scholarships ranging from \$300 to \$1,000 are offered to outstanding freshmen with financial need through the College of Human Sciences and Education. Additional academic scholarships also are available each year for returning students.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CSCI 114		3 COMM 110	3
ENGL 110		3 ENGL 120	3
HDFS 186		3 HDFS 341	3
HDFS 230		3 MATH 104	3
PSYC 111		3 SOC 110	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
ADHM 155 or 101		3 ADHM 410	3
CHEM 117		3 H&CE 469	3
CHEM 117L		1 HDFS 275	3
EDUC 321		3 Gen Ed Wellness	2
H&CE 232		3 HNES 217	3
HDFS 250		3 Apply to the School of Education	

Complete Core Academic Skills
Exam or access your ACT+ scores

		16	14
Third Year			
Fall	Credits	Spring	Credits
ADHM 366		3 ADHM 316	3
EDUC 322		3 EDUC 451	3
ENGL 358		3 H&CE 468	3
H&CE 467		3 HDFS 357	3
HDFS 341		3 HNES 261	3
		HNES 261 L	2
		15	17
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 486		3 H&CE 483	1
EDUC 489		3 H&CE 487	9
H&CE 482		3 H&CE 488	3
HDFS 462		3	
Gen Ed Science & Tech and Global Perspective		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
		15	13
Total Credits: 120			

Family and Consumer Sciences Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/family-consumer-sciences-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/family-consumer-sciences-education/#planofstudytext>)

Major Requirements

Major: Family & Consumer Sciences Education

Degree Type: B.S.

Minimum Degree Credits to Graduate: 124

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

The Family & Consumer Sciences Education Specialty requirements also includes those courses listed in the general education categories of Social & Behavioral Sciences and Science & Technology.

Code	Title	Credits
Family & Consumer Sciences Education Requirements		
CHEM 117	Chemical Concepts and Applications (May satisfy general education category S)	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
ENGL 358	Writing in the Humanities and Social Sciences (May satisfy general education category C)	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
Teaching Specialty Requirements		
ADHM 155	Apparel Construction and Fit	3
or ADHM 101	Beginning Apparel Construction	
ADHM 366	Textiles	3
ADHM 410	Dress in World Cultures	3
or ADHM 486	Dress and Human Behavior	
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HDFS 242	Couples, Marriages and Families	3

HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	3
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
H&CE 469	Housing Education and Issues	3
HNES 200	Principles of Nutrition (May satisfy general education category W)	3
HNES 217	Personal and Community Health	3
HNES 261 & 261L	Food Selection and Preparation Principles and Food Selection and Preparation Principles Laboratory	5
Housing/Design/Consumer Education: Select one of the following:		3
ADHM 151	Design Fundamentals	
ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
H&CE 232	Philosophy and Policy	3
H&CE 467	Advising Family, Career, and Community Leaders of America	3
H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	3
H&CE 482	Methods of Teaching Family and Consumer Sciences II: Professional Practices	3
H&CE 483	Student Teaching Seminar	1
H&CE 487	Student Teaching	9
H&CE 488	Applied Student Teaching	3
Total Credits		105

Degree Requirements and Notes

- The following courses are recommended but not required for the program: ADHM 151 Design Fundamentals AND ADHM 367 Textiles Laboratory.
- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Family Financial Planning

Department Information

- **Department Location:**
EML Hall 283
- **Department Web Site:**
<https://www.ndsu.edu/hdfs/>
- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/family-financial-planning/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/family-financial-planning/>)

The Family Financial Planning undergraduate certificate is designed for students who want to help individuals and families with financial challenges work toward long-term financial well-being. Required courses give students experience in consumer issues, personal and family financial planning, and financial counseling, and are grounded in real-world, hands-on learning opportunities. Students will learn foundational information as well as how to

apply it in practice with both individuals and families. Completion of the certificate makes students eligible to take the Accredited Financial Counseling exam, the first step in becoming an Accredited Financial Counselor (AFC) ©.

Family Financial Planning

Department Information

- **Department Location:**
EML Hall 283
- **Credential Offered:**
Certificate
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/family-financial-planning/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/family-financial-planning/>)

Certificate Requirements

Family Financial Planning

Required Credits: 9

Code	Title	Credits
HDFS 186	Consumer and Society	3
HDFS 357	Personal and Family Finance	3
HDFS 477	Financial Counseling	3
Total Credits		9

Finance

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/afis/ (<http://www.ndsu.edu/business/departments/afis/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/finance/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/finance/#planofstudytext>)

Major Requirements

Major: Finance

Degree Type: B.S.

Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
All courses taken for the Finance Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300 - 400 level courses, and to graduate.		
Requirements for Admission to Professional Program Requirements:		
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C)	3
ENGL 120	College Composition II (May satisfy general education category C)	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
or SOC 110	Introduction to Sociology	
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
or ECON 202	Principles of Macroeconomics	
Finance Major Requirements:		
TL 116	Business Software Applications	3
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G)	3
or ECON 201	Principles of Microeconomics	
PHIL 216	Business Ethics (May satisfy general education category A)	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
Admission to Professional Program Required prior to taking the following courses:		
FIN 320	Principles of Finance (requires a grade of C or better) ¹	3
MGMT 320	Foundations of Management ¹	3
MIS 320	Management Information Systems ¹	3
MRKT 320	Foundations of Marketing ¹	3
FIN 410	Investment Analysis and Management	3
FIN 420	Options, Futures, and Other Derivatives	3

FIN 430	Management of Financial Institutions	3
FIN 440	International Finance	3
FIN 460	Corporate Finance	3
BUSN 430	Legal and Social Environment of Business ¹	3
BUSN 489	Strategic Management (Capstone Course) ¹	3
Finance Electives		
Select 9 credits of 300-400 level courses with the FIN prefix		9
300-400 Level Electives		
Select any course prefix at the 300-400 level		12
Total Credits		93

¹ Denotes Common Body of Knowledge (CBK) course.

- Students follow the published curricula for the finance program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission into the finance major: Students must submit an online application to the CoB.
- Admission to the finance major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the finance major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.

Certificate Requirements

Certificate: Finance

Minimum Required Credits: 9

Code	Title	Credits
FIN 320	Principles of Finance	3
Select 2 courses from the following:		6
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 430	Management of Financial Institutions	
FIN 440	International Finance	
FIN 450	Advanced Bank Management	
FIN 451	Credit Analysis	
FIN 460	Corporate Finance	
FIN 470	Analysis of Fixed-Income Securities	
FIN 480	Applied Portfolio Management	
Total Credits		9

Degree Notes:

- Students must earn a 2.50 cumulative GPA in the courses used to satisfy the certificate requirements.
- Courses may not be taken Pass/Fail.
- Required courses for the certificate may require prerequisites.

Finance

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-5845
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/majors/ (<http://www.ndsu.edu/business/programs/undergraduate/majors/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/finance/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/finance/>)

As a finance major, you will learn the fundamental concepts and tools to make informed and responsible financial decisions using data and creativity. Finance students know how to estimate economic value and evaluate the riskiness of a project or a financial asset, to advise firms about paying for projects, and to appraise a firm's performance on the stock market. We successfully place our graduates in business, industry and non-profit organizations.

Background Information

AACSB International-The Association to Advance Collegiate Schools of Business accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. The College of Business is one of only two accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, stressing academic excellence and a commitment to continuous improvement. Less than 10 percent of business programs worldwide have this accreditation.

The Program

Business students take core courses that cover all of the functional areas of a business, from marketing to management and accounting. Finance courses build on this foundation to help students understand the way that businesses operate in a global economy. Courses cover corporate finance, international finance, investments, portfolio management and more. The finance program is approved as a CFA Institute University Affiliation Program which positions students well to obtain the Chartered Financial Analyst® designation, the most respected and recognized investment credential in the world. Your assignments might be project-driven or include group presentations so that you can practice what you learn in class. In addition to a thorough knowledge of finance, you'll learn teamwork, effective written and oral communication skills, and leadership.

CERTIFICATE

Any student (degree-seeking or non-degree seeking) can enhance their employability by adding a Certificate in Finance to their major or credentials. The minimum number of credits is nine (9). Finance Certificate-seeking students must take Finance 320—Principles of Finance and then select two additional courses from the available course list.

HANDS-ON EXPERIENCE

Business students can join the Bison Fund (Student Managed Investment Fund) to get a chance to manage a real-money investment fund worth more than \$1.2 million using state-of-the-art Bloomberg terminals in the Commodities Trading Lab. The Bison Fund brings financial theory and investment practice together while providing students access to the same data used by Wall Street analysts.

Selective Admission

Students who wish to study finance at NDSU enroll as pre-finance majors in the College of Business for the first semester of their freshman year. Pre-finance majors then apply for admission to the professional program after completing the pre-professional courses required for professional program admission, including ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110. Transfer students with appropriate course work also may apply.

Admission to the professional program is based upon the successful completion of the pre-professional course requirements and a minimum cumulative grade point average (GPA) of 2.5.

The Faculty

In order to provide a rigorous and timely educational experience, we have recruited and attracted faculty who are highly qualified to teach finance. Dedicated to student learning, our faculty have often been recognized for their teaching excellence by students and colleagues. The faculty employ a wide variety of instructional techniques and are considered especially strong in approaches to the study of organizations and management decision making. They remain current in their sub-fields of finance by actively engaging in research and constantly assisting firms in identifying and solving business problems.

The Practicum

Finance majors are encouraged to complete a three-credit practicum. The practicum is designed to enable students to relate finance concepts learned in the classroom to actual business situations and to give them a competitive edge in job placement.

Career Opportunities

Graduates with a finance major have opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Job opportunities for finance majors are found in corporate finance and the financial services industries, such as banking, insurance, brokerage, investment banking and financial planning.

The College

The College of Business also offers majors in accounting, business administration, management, marketing, management information systems, and global business (second major only), as well as Master of Business Administration and Master of Accountancy degrees.

High School Preparation

It is recommended that high school students interested in studying finance at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, English and communication also would be of benefit. Please speak with a professional advisor for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
TL 116		3 ENGL 120	3
Gen Ed Humanities/Fine Arts		3 MATH 144	4
Gen Ed Wellness		2 PSYC 111 or SOC 110	3
Non-major Elective		3 Gen Ed Cultural Diversity	3
		14	16
Sophomore			
Fall	Credits	Spring	Credits
ACCT 200		3 ACCT 201	3
ECON 201		3 ECON 202	3
PHIL 216		3 STAT 331	2
STAT 330		3 Non-major Elective	3
Gen Ed Science & Technology		3 Gen Ed Science & Tech (w/lab)	4
		15	15
Junior			
Fall	Credits	Spring	Credits
ENGL 320		3 BUSN 430	3
FIN 320		3 FIN 410	3
MGMT 320		3 FIN 430	3
MIS 320		3 300-400 Level CoB Elective	6
MRKT 320		3	
		15	15
Senior			
Fall	Credits	Spring	Credits
FIN 460		3 BUSN 489	3
300-400 Level Finance Elective		3 300-400 Level Finance Electives	6
300-400 Level CoB Elective		3 300-400 Level Approved Electives ¹	6
300-400 Level Approved Elective ¹		3	

Non-major Elective	3	
	15	15

Total Credits: 120

- ¹ Approved electives include College of Business courses or those with the following prefixes: AGECE, CSCI, ECON MATH, and STAT. Must earn a letter grade.

Food Science

Department Information

- **Department Location:**
Harris Hall
- **Department Phone:**
701-231-7971
- **Department Email:**
ndsu.plantsciences@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/foodscience/ (<http://www.ag.ndsu.edu/foodscience/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/food-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/food-science/>)

Food science deals with the transformation of raw agricultural goods into food products acceptable for human consumption. This field of applied science involves studying diverse scientific disciplines such as chemistry, engineering, microbiology, biochemistry, toxicology and management as they relate to food, and effectively applying the industrial and practical aspects to product development, food processing, preservation and marketing.

The Faculty and Facilities

Food science is a four-year curriculum offered by the College of Agriculture, Food Systems, and Natural Resources through the Department of Plant Sciences. The program draws on the expertise of faculty members in several departments at North Dakota State University who have expertise in both teaching and research. Many have industry experience with numerous connections in the food industry.

The Quentin Burdick Building (QBB) and Harris Hall at NDSU house laboratories and teaching facilities where many of the food science courses are taught. Extensive facilities are available for teaching and food processing research.

The Curriculum

The program includes courses in food chemistry, food analysis, food microbiology, food processing, food engineering, meat science, nutrition science and cereal technology, in addition to basic courses in mathematics, the sciences, humanities and social sciences. Most of the applied courses in food science are taken after the basic courses have laid the groundwork for the student.

The program allows flexibility in selecting suitable electives to direct one's career goal. Areas of emphasis include food safety, microbiology, sciences, business and management, engineering, nutrition and processing.

The curriculum for food science is approved by the Institute of Food Technologists (IFT). The four-year undergraduate program leads to a Bachelor of Science degree in food science. The program enables graduates to recognize, critically analyze and solve problems realistically in both industrial and academic environments. It provides the opportunity to gain industrial experience during undergraduate study by means of industry internships.

Career Opportunities

Challenging and rewarding entry-level positions in the food industry are plentiful for food science graduates. Potential employers include large and small food corporations and government agencies. Career opportunities include positions in food science and technology, food chemistry, food microbiology, product development, quality control, food production and processing, food inspection, packaging, sales and marketing. The median total compensation for an individual with a B.S. degree in food science is \$80,250 according to the Institute of Food Technologists' Salary Survey.

Food scientists study food to improve existing products or create new ones. They also analyze the structure and composition of food and the changes that occur during processing and storage. They determine how processing affects flavor, texture, appearance and nutritional value, and explore new ways to protect and stabilize food through packaging.

The food industry is the largest industry in the world. The challenges of food scientists are to provide wholesome, tasty and nutritious foods for the consumer.

Industry Internships

Internships offered through NDSU's food science department and Cooperative Education programs provide opportunities for industry experience at companies such as Cargill, Hormel, Dakota Growers Pasta Co., Jennie-O and others.

Financial Aid and Scholarships

Loans, grants and work-study are made available through the Office of Financial Aid and Scholarships. A number of scholarships are awarded each year to students enrolled in the College of Agriculture, Food Systems, and Natural Resources. Departmental scholarships also are available. Information may be obtained by contacting the coordinator of the food science program. A number of laboratory assistant jobs are available for students majoring in food science.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
AGRI 189		1 BIOL 151	3
BIOL 150		3 CHEM 122 & 122L	4
CFS 210		3 COMM 110 (Gen Ed Category C)	3
CHEM 121 & 121L (Gen Ed Category S)		4 ENGL 120 (Gen Ed Category C)	3
ENGL 110 (Gen Ed Category C)		3 MATH 146 or 165 (Gen Ed Category R)	4
Gen Ed Humanities/Fine Arts (Gen Ed Category A)		3	
		17	17
Sophomore			
Fall	Credits	Spring	Credits
CFS 370		3 BIOC 260 or 460 <i>and</i> 460L	4
CSCI 114 or TL 116 (Gen Ed Category S)		3 ECON 201 (Gen Ed Category B & G)	3
PHYS 211 & 211L (Gen Ed Category S)		4 HNES 250 (Gen Ed Category W)	3
Gen Ed Humanities/Fine Arts and Cultural Diversity (Gen Ed Category A and D)		3 Gen Ed Social and Behavioral Sci (Gen Ed Category B)	3
Elective		3	
		16	13
Junior			
Fall	Credits	Spring	Credits
CFS 450		3 CFS 452	3
CHEM 341 & 341L		4 CFS 470	3
ENGL 320, 321, or 324 (Gen Ed Category C)		3 CFS 471	1
MICR 350 & 350L		5 CFS 474	3
		STAT 330 (Gen Ed Category R)	3

Elective				3
15				16
Senior				
Fall	Credits	Spring	Credits	
CFS 430 or ABEN 263		3 ANSC 340		3
CFS 460		3 CFS 464		3
CFS 461		1 CFS 480		3
MICR 453		3 Electives		4
Elective		3		
13				13
Total Credits: 120				

Food Science

Department Information

- **Department Location:**
Harris Hall
- **Department Phone:**
701-231-8790
- **Department Web Site:**
www.ag.ndsu.edu/foodscience/ (<http://www.ag.ndsu.edu/foodscience/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/food-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/food-science/#planofstudytext>)

Major Requirements

Major: Food Science

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		

Quantitative Reasoning (R) [†]	3
Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{*†}	
Global Perspectives (G) ^{*†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Required Core Courses for Food Science		
PLSC 189	Skills for Academic Success	1
ANSC 340	Principles of Meat Science	3
CFS 210	Introduction to Food Science and Technology	3
CFS 370	Food Processing I	3
CFS 430	Food Unit Operations	3
CFS 450	Cereal Technology	3
MICR 453	Food Microbiology	3
CFS 460	Food Chemistry	3
CFS 461	Food Chemistry Laboratory	1
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 474	Sensory Science of Foods	3
CFS 480	Food Product Development (Capstone)	3
SAFE/CFS/AGEC 452	Food Laws and Regulations	3
Supporting Courses		
Select one of the following:		3-4
BIOC 260	Elements of Biochemistry	
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	
BIOL 150	General Biology I	3
BIOL 151	General Biology II	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
HNES 250	Nutrition Science (May satisfy general education category W)	3
MATH 146 or MATH 165	Applied Calculus I (May satisfy general education category R) Calculus I	4

MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Total Credits		85-86

- ¹ PLSC189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take PLSC189.

Degree Requirements and Notes:

- A 2.00 cumulative GPA is required for graduation and to remain in program.

Food Science and Technology

Department Information

- **Department Location:**
Harris Hall
- **Department Phone:**
701-231-7971
- **Department Web Site:**
www.ag.ndsu.edu/foodscience/ (<http://www.ag.ndsu.edu/foodscience/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/food-science-technology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/food-science-technology/>)

Food Science and Technology is an academic minor program with a mission to provide students with the skills necessary to be successful in a career that provides people with safe, nutritious, high quality foods and lifelong learning through research, teaching, and outreach activities.

Food Science and Technology

Department Information

- **Department Location:**
Harris Hall
- **Department Phone:**
701-231-8790
- **Department Web Site:**
www.ag.ndsu.edu/foodscience/ (<http://www.ag.ndsu.edu/foodscience/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/food-science-technology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/food-science-technology/>)

Minor Requirements

Minor: Food Science & Technology

Minimum Required Credits: 19

A grade of C or better required for all minor courses.

Code	Title	Credits
Required Core		
CFS 210	Introduction to Food Science and Technology	3

CFS 370	Food Processing I	3
CFS 464	Food Analysis	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 452	Food Laws and Regulations	3
Elective Courses: Select 3 credits from the following:		3
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
CFS 450	Cereal Technology	
CFS 460	Food Chemistry	
CFS 461	Food Chemistry Laboratory	
CFS 474	Sensory Science of Foods	
CFS 480	Food Product Development	
MICR 453	Food Microbiology	
PLSC 210	Horticulture Science	
PLSC 415	Vegetable Crop Production	
Total Credits		19

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.

Fraud Investigation

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/afis/ (<http://www.ndsu.edu/business/departments/afis/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/fraud-investigation/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/fraud-investigation/>)

Minor Requirements

Minor: Fraud Investigation

Required Credits: 24

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I ¹	3
ACCT 201	Elements of Accounting II ¹	3
ACCT 410	Fraud Examination ²	3
ACCT 411	Advanced Fraud Examination ³	3
CJ 201 or CJ 230	Introduction to Criminal Justice Criminology	3
Select three from the following:		9
ACCT 421	Auditing I	
CJ 315	Federal Law Enforcement and Crime Policy	
CJ 330	Criminal Law and Procedure	
CJ 407	Deviant Behavior	

CJ 460	Criminal Court System
CSCI 469	Network Security
MIS 479	Business Data Mining and Predictive Analytics
POLS 230	Judicial Process
POLS 431	Constitutional Law-Criminal Justice

Total Credits**24**

- 1 ACCT 200 and ACCT 201 require a grade of 'B' or better to enroll in 300-400 level accounting courses.
- 2 ACCT 410 Fraud Examination may be waived if the student has taken ACCT 610 Fraud Examination
- 3 ACCT 411 Advanced Fraud Examination may be waived if the student has taken ACCT 611 Advanced Fraud Examination

Minor Requirements and Notes

- This minor must be declared with the College of Business.
- Acceptance into this minor program requires students to earn a grade of 'C' or better in all courses and maintain a minimum institutional cumulative GPA of 2.50. Students must be junior standing (60 credits). **Courses may not be taken pass/fail.**
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the College of Business courses until his/her cumulative GPA returns to 2.50 or better.
- Approval for a minor does not guarantee enrollment in specific courses.
- A minimum of 8 credits must be taken at NDSU.

Fraud Investigation

Department Information

- **Department Location:**
Richard H. Barry Hall or Putnam Hall
- **Department Phone:**
231-8651 or 231-8567
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/minors/ (<http://www.ndsu.edu/business/programs/undergraduate/minors/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/fraud-investigation/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/fraud-investigation/>)

Fraud Investigation

The Department of Accounting and Information Systems, in collaboration with the Department of Criminal Justice, offers a minor in Fraud Investigation. Students will study the causes of fraud, as well as the detection, investigation, and prevention of fraud. Students learn about the criminal justice system including law making, criminality, and prosecution of fraud and other types of crime. This minor will prepare students for possible careers in crime investigation, litigation support, or forensic accounting.

The Fraud Investigation minor has minimum entrance and completion requirements. See the Minor Requirements guide or contact the Department of Accounting and Information Systems (<https://www.ndsu.edu/business/programs/undergraduate/majors/>) or the Department of Criminal Justice (<https://www.ndsu.edu/cjps/>) for further information on requirements.

French

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)

- **Credential Offered:**

B.A.; B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/french/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/french/>)

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include health care, public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

Students wishing to prepare for high school teaching should make this intention known to the School of Education and to the Department of Modern Languages to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
Gen Ed Quantitative Reasoning		3 FREN 312	3
FREN 311		3 Gen Ed Wellness	2
Gen Ed Social and Behavioral Sciences		3 Gen Ed Science/Tech with lab	4
Gen Ed Science/Tech		3 AHSS College Requirement	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
FREN 315		3 One year of a Second Language Course	3-4
One year of a Second Language Course		3-4 AHSS College Requirement	3
Gen Ed Science/Tech		3 Minor Courses or Elective	6
COMM 110		3 FREN Upper-Division elective	3
Minor or 2nd major		3	
		15-16	16
Third Year			
Fall	Credits	Spring	Credits
FREN 350		3 FREN 492	12-15
FREN Upper-Division Elective		3	
Gen Ed Social & Behavioral Science		3	

Minor or 2nd major	9		
	18		12-15
Fourth Year			
Fall	Credits	Spring	Credits
FREN Upper-Division Elective Course		3 FREN 489 (Senior Thesis)*	1
Minor or 2nd major		10 FREN Upper-Division Elective	3
FREN 360		3 FREN Upper-Division Elective	3
		Minor Courses or Electives	6
	16		13
Total Credits: 120-124			

* FREN 489: Senior Thesis must be completed after the study abroad experience.

French

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/french/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/french/#planofstudytext>)

Major Requirements

Major: French

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	

ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

- A minimum grade of "B" is required for all FREN courses counted toward the major.

Code	Title	Credits
French Major Requirements		
Of the 28 credits required for the French major, 15 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad). Note: Other University-wide residency requirements will apply.		
Required Core Courses:		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
FREN 350	Introduction to French Linguistics and Pronunciation	3

Elective Courses: Select 15 credits from the following:		15
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 360	Studies in Language and Style	
FREN 365	Advanced Conversation Through Contemporary Culture	
FREN 370	Translation: Practice and Theory	
FREN 401	Approaches to Literature	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
One Year of a Second Language		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both semesters.		
Ancillary Courses:		6
Choose at least two courses. Consult department or adviser for other courses that may count. Courses selected from current General Education course list may also count here.		
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ARCH 321	History and Theory of Architecture I	
ARCH 322	History and Theory of Architecture II	
ART 111	Introduction to Art History	
ART 210	Art History I	
ART 211	Art History II	
COMM 216	Intercultural Communication	
ENGL 209	Introduction to Linguistics	
ENGL 240	World Literature Masterpieces	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
HIST 457	Europe Since 1914	
HIST 435	World Environmental History	
POLS 220	International Politics	
POLS 225	Comparative Politics	
POLS 444	International Law	
SOC 116	Global Social Problems	
THEA 115	World Film	
THEA 280	World Theatre	
Study Abroad & Capstone Experience:		
FREN 492	Study Abroad (Requires a minimum of one semester-14 weeks at 300+ level in a program pre-approved by the Modern Languages Dept.) ¹	1-12
FREN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Total Credits		35-46

¹ Students may choose to participate in the TAPIF (Teaching Assistant Program in France), sponsored by the French government. The students spend a full 9 months immersed in a French school teaching Conversational English (12 hours/week). This experience does not carry any credit but does provide students an immersion into the culture.

Minor Requirements

Minor: French

Required Credits: 18

Minor Requirements

- A minimum grade of B is required for all courses used for the French minor.

Code	Title	Credits
Core Requirements		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
Select one of the following:		3
FREN 350	Introduction to French Linguistics and Pronunciation	
FREN 360	Studies in Language and Style	
FREN 365	Advanced Conversation Through Contemporary Culture	
Electives: Select 2 courses from the following or what wasn't used above:		6
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 370	Translation: Practice and Theory	
FREN 401	Approaches to Literature	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU. Courses may not be taken Tri-College or study abroad.

French Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/french-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/french-education/>)

French Education involves learning about French language and culture, while simultaneously developing knowledge and skills related to teaching. Your classes will be a blend of content courses related to the language, as well as teaching courses.

The Program

Candidates in the French education major are prepared to teach French to students in grades 5-12 with creativity and confidence. Teacher candidates get the best of both worlds: content courses with faculty in the Department of Modern Languages and professional education courses from faculty in the School of Education (SOE). In addition to required courses, French teacher candidates need to study abroad where the target language is spoken.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators or meet minimum scores on the ACT+. A minimum grade of "B" is required in the FREN teaching specialty courses. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates have the opportunity to apply knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced French teachers in middle

or secondary schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Teacher candidates will be assigned individual advisors who will work closely in program planning and in other ways to advise and assist them. Students are encouraged to seek advising from both Modern Languages and the School of Education whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure to teach French in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

The demand for language teachers continues to be great. In general, "employment of high school teachers is projected to grow 8 percent from 2016 to 2026, about as fast as the average for all occupations. Rising student enrollment should increase demand for high school teachers, but employment growth will vary by region" (<https://www.bls.gov/ooh/education-training-and-library/high-school-teachers.htm>)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110 (Gen Ed Category C)		3 COMM 110 (Gen Ed Category C)	3
FREN 311		3 ENGL 120 (Gen Ed Category C)	3
Quantitative Reasoning Gen Ed		3 FREN 312	3
Social & Behavioral Science Gen Ed/ Ancillary French		3 EDUC 321	3
Wellness Gen Ed		2 Social & Behavioral Science Gen Ed/ Ancillary French	3
		Complete Core Academic Skills Exam or access your ACT+ scores	
		14	15
Second Year			
Fall	Credits	Spring	Credits
EDUC 322		3 EDUC 451	3
EDUC 481		3 FREN Elective	3
FREN 315		3 French Special Methods (completed through Tri-College at MSUM or Concordia)	3
Other Foreign Language I		4 Science & Technology Gen Ed	3
Science & Technology Gen Ed		3 Other Foreign Language II	4
Apply to School of Education			
		16	16
Third Year			
Fall	Credits	Spring	Credits
EDUC 489		3 Semester Abroad (5 upper division French courses approved by advisor)	15
FREN 350		3	

FREN 360 (May be used as Gen Ed Category C)	3			
Science & Technology Gen Ed + Lab	4			
Elective	3			
	16			15
Fourth Year				
Fall	Credits	Spring	Credits	
EDUC 486		3 EDUC 485		1
FREN 489		1 EDUC 487		9
FREN Elective		3 EDUC 488		3
FREN Elective		3		
Elective		3		
Elective		3		
Apply for student teaching				
Complete PLT (grades 7-12) Exam				
Complete Subject Area Assessment Exam				
	16			13
Total Credits: 121				

French Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/french-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/french-education/#planofstudytext>)

Major Requirements

Major: French Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.		
A minimum grade of 'B' is required in the teaching specialty courses.		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France	3
FREN 350	Introduction to French Linguistics and Pronunciation	3
FREN 360	Studies in Language and Style (May satisfy general education category C)	3
FREN 401	Approaches to Literature	3
Select four of the following:		12
FREN 340	The French-Speaking World	
FREN 345	Women in French Literature	
FREN 365	Advanced Conversation Through Contemporary Culture	
FREN 370	Translation: Practice and Theory	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
FREN 420	Themes & Topics in French Literature & Culture	
FREN 422	Genres in French Literature	
Study Abroad & Capstone Experience		
FREN 492	Study Abroad (min 1 semester-14 weeks-at 300+ level in a program pre-approved by Modern Languages Dept.)	1-15
FREN 489	Senior Thesis (Consult department/adviser semester before enrolling)	1
Foreign Language		8
A minimum of one year of a second foreign language is required with grades of 'C' or better in both courses.		
Ancillary Electives		6

Choose at least two courses from the following areas: Western Civilization, History of Europe or Africa, World Literature or Mythology, or any area of linguistics. Consult department or adviser for approved list. May count towards general education requirements.

Professional Education Requirements

A grade of 'C' or better is required in the following courses.

EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Lang)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3

Total Credits

77-91

Degree Requirements and Notes

- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Of the 28 required credits of French, a minimum of 15, in addition to the capstone, must be resident credit (i.e. taken at NDSU, cannot be Tri-College nor study abroad).
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and two years of one modern foreign language at the college level or equivalent are required.

French Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/french-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/french-studies/>)

Minor Requirements**Minor: French Studies**

Required Credits: 18

Code	Title	Credits
French Studies Core Requirements		
FREN 311	French Conversation and Composition I	3
FREN 312	French Conversation and Composition II	3
FREN 315	Contemporary France (May be done through Study Abroad)	3
History Electives		
Must be a sequence. A student may also select a sequence appropriate to his/her area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	

GEOG 151	Human Geography
GEOG 161	World Regional Geography
POLS 220	International Politics
FREN 492	Study Abroad

Total Credits**18**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

French Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/french-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/french-studies/>)

Broader in scope than the traditional minor which emphasizes linguistic competence, the French Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and civilization study beyond the intermediate level (FREN 311 (<https://bulletin.ndsu.edu/search/?P=FREN%20311>), FREN 312 (<https://bulletin.ndsu.edu/search/?P=FREN%20312>) and a civilization course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

General Agriculture

Department Information

- **Department Location:**
Morrill Hall 315
- **Department Phone:**
701-231-8790
- **Department Web Site:**
www.ag.ndsu.edu/academics/ (<http://www.ag.ndsu.edu/academics/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/general-agriculture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/general-agriculture/>)

The general agriculture program is designed to serve students who wish to pursue a college education in the broad area of agriculture. Traditionally, students who have been undecided about their future plans have selected this major to explore the various career options available to them in agriculture before selecting a major. Some students desiring to tailor a degree to meet their career objectives in production agriculture have majored in general agriculture. In addition, some transfer students from two-year institutions find the greater flexibility of the general agriculture major useful in obtaining a bachelor's degree.

The Program

General agriculture provides a broad-based program in agriculture for students who wish to have a diversified program of study that emphasizes several agricultural disciplines. In addition, general agriculture provides for an exploratory program in agriculture for students undecided about which

of the 19 majors available in the College of Agriculture, Food Systems, and Natural Resources is best for their individual plans. General agriculture also provides the opportunity for students to pursue an agricultural major and to complete the requirements to be able to teach high school agriculture.

Students receive broad exposure to four or more disciplines and have a large number of unrestricted electives that may be utilized to prepare for specific careers. The flexibility of the curriculum is a point of interest for many students. Several students transferring from two-year institutions have found that they could complete the requirements for a bachelor's degree in general agriculture more quickly than other majors. However, transfer students are still encouraged to consider majors in the specific disciplines if that is their career objective.

Agriculture Disciplines

In addition to a broad set of general education courses, students complete course work in four agricultural disciplines. This is somewhat similar to completing partial minors in four of the academic programs in the College of Agriculture, Food Systems, and Natural Resources. Students must complete 15 credits in one of the disciplines, 12 credits in one discipline, and nine credits in two other disciplines. A capstone course must be completed in one of the disciplines. In addition, students take several electives in agriculture. Some students choose this option at the beginning of their university career while waiting to decide to have a major in one of the disciplinary areas.

Agricultural Education

NDSU offers the opportunity for a student to prepare for a career as an agriculture teacher in the public school system, in addition to a broad range of careers in the agricultural industry. The degree in agricultural education may be completed in the College of Human Development and Education. Students who wish to pursue agricultural education also have the option to have a major in general agriculture and choose agricultural education as a second major. The general agriculture degree program is sufficiently flexible that both majors may be completed without an increase in the total number of credits required for completion.

In addition, students pursuing this approach will be eligible for scholarships and all activities in the College of Agriculture, Food Systems, and Natural Resources.

Faculty and Facilities

General agriculture does not have its own faculty since the faculty in the College of Agriculture, Food Systems, and Natural Resources are housed in academic departments. General agriculture relies on departments to teach basic and advanced courses within their disciplines. A coordinating committee with faculty representing several areas of agricultural sciences administers the general agriculture program. Advisors for students are selected within various disciplines. These faculty members work with students in developing an appropriate plan of study and assist students in exploring various career opportunities.

Financial Aid and Scholarships

Loans, scholarships, grants, and work-study are available through the Office of Financial Aid and Scholarships. Students requiring financial assistance should contact the Office of Financial Aid and Scholarships or One Stop directly. In addition, the College of Agriculture, Food Systems, and Natural Resources has several scholarships available for outstanding students based primarily on academic performance. Contact the Office of the Associate Dean, College of Agriculture, Food Systems, and Natural Resources for information and application forms.

Extra-Curricular Activities

Students are highly encouraged to become active members in at least one student organization, several of which are sponsored by the academic departments in the College of Agriculture, Food Systems, and Natural Resources.

Career Opportunities

Employment opportunities for students in general agriculture remain strong and are similar to those of other production agriculture majors. Generally, the demand for graduates from the College of Agriculture, Food Systems, and Natural Resources exceeds the number of available graduates. Students can greatly enhance their employability by obtaining at least one summer internship during their formal education.

Employers indicate that the most important characteristics desired in graduates include excellent oral and written communication skills, ability to meet and work with people under a variety of conditions, initiative, and work ethic. The USDA publishes a report every five years about prospects for careers in Agriculture, Food, and Natural Resources. These reports consistently say that the career opportunities for graduates in these fields are excellent.

General Agriculture Minor

A minor in general agriculture may be obtained by satisfactorily completing 24 credits with at least six credits in each of any four disciplines offered by the College of Agriculture, Food Systems, and Natural Resources.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
AGRI 189		1 ENGL 120 (Category C)	3
ENGL 110 (Category C)		3 COMM 110 (Category C)	3
MATH 103 (or higher level Math)		3 Gen Ed Social & Behavioral Science and Global Perspectives (Categories B & G)	3
CHEM 117, 121, or BIOL 111 (Category S)		3 CSCI 114 or TL 116 (Category S)	3
CHEM 117L, 121L, or BIOL 100L (Category S)		1 Gen Ed Wellness (Category W)	2
ANSC 114 (or other lower division class with CAFSNR prefix)		3 PLSC 110 (or other lower division class with CAFSNR prefix)	3
		14	17
Second Year			
Fall	Credits	Spring	Credits
Gen Ed Social & Behavioral Sci (Category B)		3 STAT 330 (Category R)	3
Discipline 1 class		3 Gen Ed Hum & Fine Arts (Category A)	3
Discipline 2 class		3 Discipline 1 class	3
Discipline 3 class		3 Discipline 2 class	3
Discipline 4 class		3 Discipline 3 class	3
Elective		1 Elective	1
		16	16
Third Year			
Fall	Credits	Spring	Credits
Gen Ed Humanities and Fine Arts and Cultural Diversity (Categories A & D)		3 Upper division Discipline 1 class	3
Gen Ed Upper Division Writing (Category C)		3 Upper division CAFSNR elective	3
PLSC 315 (Category S)		3 Discipline 4 class	3
Discipline 1 class		3 CAFSNR elective	3
Discipline 4 class		3 CAFSNR elective	3
Elective		1 Elective	1
		16	16
Fourth Year			
Fall	Credits	Spring	Credits
Upper division Discipline 1 class		3 Capstone class (any CAFSNR prefix) (Course description contains the word "capstone")	3
Upper division Discipline 2 class		3 Upper division Discipline 2 class	3
Upper division Discipline 3 class		3 Electives	10
Discipline 4 class		3	
Upper division CAFSNR elective		3	

Elective	1	
	16	16

Total Credits: 127

CAFSNR - College of Agriculture, Food Systems and Natural Resources - Prefixes include AGECE (Agricultural Economics), ABEN (Agricultural and Biosystems Engineering), ASM (Agricultural Systems Management), AGRI (Agriculture), ANSC (Animal Science), ECON (Economics), ENT (Entomology), SAFE (Food Safety), MICR (Microbiology), PPTH (Plant Pathology), PLSC (Plant Sciences), RNG (Range Science), SOIL (Soil Science), VETS (Veterinary Science).

"Category" refers to the General Education categories (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/general-education/#genedcoursestext>)

"Discipline" refers to the four CAFSNR disciplines which must be included in a General Agriculture curriculum. A discipline may be thought of as a prefix. Some prefixes can be combined to form a discipline. If a student chooses to have Agricultural Education as a second major, one of the disciplines may include the required education courses in the College of Human Development and Education.

General Agriculture

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-8790
- **Department Web Site:**
www.ag.ndsu.edu/academics/ (<http://www.ag.ndsu.edu/academics/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/general-agriculture/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/general-agriculture/#planofstudytext>)

Major Requirements

General Agriculture Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		

Quantitative Reasoning (R) [†]	3
Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{*†}	
Global Perspectives (G) ^{*†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Major Requirements for General Agriculture		
AGRI 189	Skills For Academic Success (or other Freshman Experience class in a CAFSNR department) ³	1
CSCI 114	Computer Applications (May satisfy a general education category S)	3
or TL 116	Business Software Applications	
MATH 103	College Algebra (or higher level mathematics)	3
PLSC 315	Genetics (May satisfy a general education category S)	3
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one of the following	(May satisfy a general education category S)	3
CHEM 117	Chemical Concepts and Applications	
CHEM 121	General Chemistry I	
BIOL 111	Concepts of Biology	
Required Discipline Courses for General Agriculture ^{1,2}		
Discipline One: Must include a minimum of 5 credits of 300-400 level		15
Discipline Two: Must include a minimum of 5 credits of 300-400 level		12
Discipline Three: Must include a minimum of 3 credits of 300-400 level		9
Discipline Four		9
Additional Agriculture Electives: 18 credits required; at least 5 credits must be at 300-400 level ²		18
Total Credits		79

- ¹
- Four (4) agriculture disciplines are required. Two disciplines require a minimum of 9 credits, a third discipline requires a minimum of 12 credits and the fourth discipline requires a minimum of 15 credits.
 - A capstone experience is required in one of the disciplines.
 - Disciplines which may be combined are: (AGEC, ECON); (ANSC, VETS); (NRM, PLSC, RNG); (ASM, ABEN); (NRM, RNG, SOIL); (CFS, SAFE); (ANSC, RNG); (PLSC, PPTH, SOIL)

- ²
- The student and adviser will complete a *General Agriculture Plan of Study* with the courses to be used for the discipline groups and agriculture electives. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of major program completion.

- ³
- AGRI189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take AGRI 189.

Degree and Major Notes

- If a course is used to fulfill General Education or Major Requirements it cannot be used towards the disciplines. This includes; PLSC 315 Genetics, ECON 201 Principles of Microeconomics and STAT 330 Introductory Statistics.
- A *General Agriculture Plan of Study* must be completed with the student's assigned academic adviser prior to the completion of 75 credits. See department for this process. The *Plan of Study*, with signatures, must be filed with the Office of Registration and Records once complete.

- This major will not be available for view in the Student Advisement/Requirement Report in Campus Connection.
- The total number of credits for this degree program is 128.

Minor Requirements

Minor: General Agriculture

Required Credits: 24

General Agriculture

Code	Title	Credits
Required Courses *		
Select six (6) credits minimum in any four (4) disciplines offered by the College of Agriculture, Food Systems, and Natural Resources with the approval of the academic department.		
Discipline One		6
Discipline Two		6
Discipline Three		6
Discipline Four		6
Total Credits		24

- * The student and adviser will complete a substitution form with the courses to be used for the discipline groups. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

Geography

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/geography/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/geography/>)

Geography Minor

Emphases in the Geography minor program are:

1. gaining an understanding of the geographic perspective, and
2. acquiring skills in the use of spatial analysis tools (such as geographic information systems (GIS), computer mapping, and other computer applications).

A Geography minor may be taken in conjunction with a variety of majors such as social science and secondary education. Minor requirements are 18 credits selected in consultation with a geography adviser in the Department of Geosciences. Students preparing for teaching geography in the secondary schools should follow the School of Education (<https://www.ndsu.edu/education/>) curricula.

Geography

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/geography/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/geography/>)

Minor Requirements

Minor: Geography

Required Credits: 18

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Department of Geosciences adviser.		18
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- The student and adviser will complete a substitution form with the courses to be used for the geography minor. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

Geology

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/geology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/geology/#planofstudytext>)

Major Requirements

Major: Geology

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.

3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Geology Core Requirements		
Students must have at least a 2.0 cumulative GPA in the geology core requirements.		
GEOG 455	Introduction to Geographic Information Systems	4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category S)	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Select one of the following:		2
GEOL 301	Lake Superior Field Course	
GEOL 302	Black Hills Field Course	

GEOL 496	Field Experience	
GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	4
GEOL 410	Sedimentology/Stratigraphy	4
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
GEOL 422	Petrology	3
GEOL 423	Petrography	1
GEOL 450	Field Geology	3
GEOL 457	Structural Geology	4
GEOL 491	Seminar (Junior Year)	1
GEOL 491	Seminar (Senior Year)	1
SOIL 444	Soil Genesis and Survey	3

Related Required Courses

Select one of the following chemistry sequences : 8

Sequence A:

CHEM 121
& 121L General Chemistry I
and General Chemistry I Laboratory

CHEM 122
& 122L General Chemistry II
and General Chemistry II Laboratory

Sequence B:

CHEM 150
& CHEM 160 Principles of Chemistry I
and Principles of Chemistry Laboratory I

CHEM 151
& CHEM 161 Principles of Chemistry II
and Principles of Chemistry Laboratory II

ENGL 324 Writing in the Sciences 3

MATH 165 Calculus I (May satisfy general education category S) 4

MATH 166 Calculus II 4

Select one of the following physics sequences: 8-10

Sequence A:

PHYS 211
& 211L College Physics I
and College Physics I Laboratory

PHYS 212
& 212L College Physics II
and College Physics II Laboratory

Sequence B:

PHYS 251
& 251L University Physics I
and University Physics I Laboratory

PHYS 252
& 252L University Physics II
and University Physics II Laboratory

Select one of the following: 3-4

CSCI 122 Visual BASIC

CSCI 160 Computer Science I

CSCI 227 Computing Fundamentals I

Total Credits

75-78

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- Majors planning on graduate studies should be aware that a summer field camp course may be required for graduate admission. This course is recommended to be taken during the summer following the junior or senior year. Information on field camp courses and a small departmental scholarship to support these studies may be obtained from an adviser.

Minor Requirements

Minor: Geology

Required Credits: 18

Code	Title	Credits
Required Courses		
All minor courses must be selected in consultation with a Department of Geosciences adviser.		18
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Select geography and soil science courses may be substituted for geology courses. A substitution form must be submitted to the Office of Registration and Records for approved substitutions.
- The student and adviser will complete a substitution form with the courses to be used for the geology minor. This form will also require the signature of the department chairperson before being submitted to the Office of Registration and Records for verification of minor program completion.
- Note: This minor will not be available for view in the Student Advisement/Requirement Report in Campus Connection until the substitution form has been received and processed.

Geology

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/geology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/geology/>)

Today is the ideal time for students to choose a career as a geoscientist. Students with a solid high school background in the sciences and mathematics, liking the outdoors and field studies, and those that are challenged by a rigorous program of classroom, laboratory and field courses, should consider North Dakota State University's program in geosciences. Geoscientists are presently in demand for energy and mineral exploration, and for solving environmental problems.

Career Opportunities

Geologists who studied at NDSU are currently employed in such diverse fields as environmental science, groundwater resources, education, community planning, cartography, engineering geology, petroleum and gas exploration, precious-metals mining, and land reclamation.

The Department

The geosciences faculty and instructional staff are dedicated to providing the best possible undergraduate education. Faculty members have earned consistently high ratings for their teaching. They also are active in research and bring the benefits of their research activities to students. Many geoscience undergraduates find part-time employment in faculty research or as laboratory teaching assistants. Courses are taught by a variety of techniques including lectures, labs, active learning, report writing and applied field studies. Field studies have included Black Hills, Death Valley, Washington, Hawaii, Iceland and southern Italy. The department's excellent instructional facilities include computers, X-ray diffraction, petrographic microscopes, GPS and surveying equipment, and a continuously-upgraded collection of rocks, minerals, air photos and maps. Training in geographic information systems is provided through the Warren D. Kress Advanced Geography Laboratory. The Optical Dating and Dosimetry Laboratory is used to determine the depositional age of sediments. The Quaternary Entomology Laboratory and the Cosmogenic Nuclide Preparation Laboratory are used for studies of climate change. The Environmental Geomechanics Laboratory is used for studies of water quality.

A core of geology courses, along with training in mathematics, physics, chemistry, soils, geography, computer science and technical writing will prepare students to handle the diverse challenges encountered in this professional career.

High School Preparation

A solid background in English, mathematics (through trigonometry), biology, chemistry and physics is strongly recommended.

The Faculty and Staff

S.S. Day, Ph.D., University of Minnesota, 2012, Fluvial Geomorphology, Slope Stability, Geospatial Sciences

B.J.C. Laabs, Ph.D., University of Madison, Wisconsin, 2004, Quaternary Geology, Paleoclimate, Geochronology

K. Lepper, Ph.D., Oklahoma State University, 2001, Glacial Geology, Hydrogeology, Geophysics

P. Oduor, Ph.D., University of Missouri, Rolla, 2004, Geochemistry, Geographic Information Systems

J.L. Rock, M.S., North Dakota State University, 2009

B. Saini-Eidukat, Ph.D., University of Minnesota, 1991, Mineralogy, Petrology, Geochemistry

L.S. Tackett, Ph.D., University of Southern California, 2014, Paleontology, Stratigraphy

S.A. Wood, Ph.D., Princeton University, 1985, Aqueous Geochemistry, Mineral Deposits

A.C. Ashworth, Ph.D., University of Birmingham, England, 1969, Earth History, Paleontology, Paleoecology (Emeritus)

D.P. Schwert, Ph.D., University of Waterloo, Canada, 1978, Quaternary Geology, Land Use (Emeritus)

Special Note

Students in the geosciences program are encouraged to use their elective credits in courses that will enhance their professional skills (i.e., foreign languages, geography, archaeology, soils, etc.). In addition, the Department of Geosciences offers elective courses in environmental geology, glacial geology, geochemistry, hydrogeology, geophysics and remote sensing.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
GEOL 105 & 105L (Gen Ed Category S)		4 GEOL 106 & 106L (Gen Ed Category S)	4
MATH 165 (Gen Ed Category R)		4 CHEM 122 or 151 (Gen Ed Category S)	3
CHEM 121 or 150 (Gen Ed Category S)		3 CHEM 122L or 161 (Gen Ed Category S)	1
CHEM 121L or 160 (Gen Ed Category S)		1 MATH 166	4
ENGL 110 (Gen Ed Category C)		3 ENGL 120 (Gen Ed Category C)	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
GEOL 410		4 GEOL 422	3
GEOL 420 & GEOL 421		4 GEOL 423	1
GEOG 455		4 GEOL 412	3
Gen Ed Wellness		2 GEOL 350 & GEOL 303	4
		Gen Ed Humanities/Fine Arts and Global Perspectives	3
		14	14

Third Year			
Fall	Credits	Spring	Credits
PHYS 211 or 251		3 PHYS 212 or 252	3
PHYS 211L or 251L		1 PHYS 212L or 252L	1
SOIL 444		3 GEOL 491 (Capstone)	2
GEOL 450		3 GEOL 301, 302, or 496	2
GEOL 457		4 Gen Ed Humanities/Fine Arts	3
ENGL 324		3 Gen Ed Social & Behavioral Science and Cultural Diversity	3
		17	14
Fourth Year			
Fall	Credits	Spring	Credits
CSCI 122, 160, or 227		3 Electives	13
Gen Ed Social & Behavioral Science		3 College Humanities or Social Sciences	3
College Humanities or Social Sciences		3	
Electives		7	
		16	16

Total Credits: 121

German Minor

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
<https://bulletin.ndsu.edu/undergraduate/program-curriculum/german/>

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include health care, public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

German

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Program Overview:**
<https://nextbulletin.ndsu.edu/programs-study/undergraduate/german/>

Minor Requirements

Minor: German

Required Credits: 18

Minor Requirements

Code	Title	Credits
German Minor Core Requirements		
GERM 220	German Culture & Society *	3
GERM 311	German Conversation and Composition I *	3
GERM 312	German Conversation and Composition II *	3
GERM 392	Study Abroad	9
Total Credits		18

* Must be taken at NDSU.

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- An additional nine credits of upper-division German must be taken from an NDSU sponsored Study Abroad experience or through one of the Tri-College University institutions. The classes that will satisfy these 9 credits must be pre-approved by the Department of Modern Languages.

German Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/german-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/german-studies/>)

Broader in scope than the traditional minor which emphasizes linguistic competence, the German Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have

chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and culture studies beyond the intermediate level (German 311, 312 and a culture course), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

German Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/german-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/german-studies/>)

Minor Requirements

Minor: German Studies

Required Credits: 18

Code	Title	Credits
German Studies Core Requirements		
GERM 220	German Culture & Society (may be completed through study abroad)	3
GERM 311	German Conversation and Composition I	3
GERM 312	German Conversation and Composition II	3
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
GERM 492	Study Abroad	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.

Gerontology

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall 255
- **Department Phone:**
701-231-8211
- **Department Web Site:**
www.ndsu.edu/socanth/undergraduate/gerontology_minor/ (http://www.ndsu.edu/socanth/undergraduate/gerontology_minor/)
- **Credential Offered:**

Minor

• **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/gerontology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/gerontology/>)

A minor in Gerontology is sponsored through the College of Human Sciences and Education (<https://www.ndsu.edu/hse/>) and the College of Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss/>). It provides students with an integrated understanding of the process of aging, aging services, and the aged in America.

A minor in gerontology at North Dakota State University provides a program of study for students interested in a variety of careers that involve work with the elderly population. Students from a variety of majors such as human development and family science, sociology, psychology, nursing, interior design and education can benefit from training in gerontology.

Career Opportunities

Career interests available would depend on the major or other training but include designer/architect of housing facilities, adult day services, elderly volunteer services, mental health services for elderly persons, geriatric nursing, social service programs for elderly persons, long-term care administration, corporate health planning or market research.

High School Preparation

Prior to coming to college, volunteer community service activities such as 4-H, scouting, and work with church youth groups can help students gain valuable experience working with people in the community. High school courses in behavioral and social sciences (e.g., social studies, economics, psychology, family life education, child development) are helpful in preparing for study in gerontology.

The Curriculum

This program is sponsored through the College of Human Sciences and Education and the College of Arts, Humanities and Social Sciences at NDSU. It makes use of the resources of the Tri-College University to provide students an integrated understanding of the process of aging, aging services and the aged in America. There are six basic areas of study. Students should follow the directions provided for each of the areas.

Gerontology

Department Information

• **Department Location:**

E. Morrow Lebedeff Hall

• **Department Phone:**

701-231-8211

• **Credential Offered:**

Minor

• **Program Overview:**

bulletin.ndsu.edu/programs-study/undergraduate/gerontology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/gerontology/>)

Minor Requirements

Minor: Gerontology

Required Credits: 19

Minor Requirements

Code	Title	Credits
Area One: Social Gerontology		
SOC 440	Sociology of Aging	3
Area Two: Developmental Psychology of Aging (Select one from the following):		3
HDFS 360	Adult Development and Aging	
PSYC 471	The Psychology Of Aging	
Area Three: Wellness and Aging (Select one from the following):		3
HNES 452	Nutrition,Health and Aging	
HDFS 230	Life Span Development	
Area Four: Macrosystems		
HDFS 480	Community Resources of Later Life	3

Area Five: Internship/Practicum**4**

A minimum of 4 credits of internship or practicum is required for this area.

Area Six: Elective (Select one from the following):**3**

ANTH 332	Medical Anthropology
HDFS 357	Personal and Family Finance
HDFS 491	Seminar (Topic must be aging related)
H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques
SOC 426	Sociology of Medicine
SOC 441	Death and Dying
HDFS 482	Family Dynamics of Aging

Total Credits**19****Minor Requirements and Notes**

- A minimum of 8 credits must be taken at NDSU.

GIS and Remote Sensing

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-84545
- **Department Web Site:**
www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)
- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/gis-remote-sensing/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/gis-remote-sensing/>)

The GIS and Remote Sensing certificate program is a 12-credit program in geospatial techniques. The certificate provides an opportunity for students to acquire additional credentials in the field and is available to Undergraduates or Graduate students from any discipline. Use and applications of GIS and Remote Sensing continue to grow and be desirable skill sets in many careers. This certificate program will provide both the depth and breadth of skills necessary for utilizing geospatial data in diverse careers.

GIS and Remote Sensing

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-8455
- **Department Web Site:**
www.dnsu.edu/geosci/ (<http://www.dnsu.edu/geosci/>)
- **Credential Offered:**
Certificate
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/gis-remote-sensing/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/gis-remote-sensing/>)

Certificate Requirements

Certificate: GIS and Remote Sensing

Minimum Credits: 9

Code	Title	Credits
GEOG 455	Introduction to Geographic Information Systems	4
GEOG 470	Remote Sensing	3
Select two classes from the following:		6
GEOG 456	Advanced Geographic Information Systems	
GEOG 465	Remote Sensing of the Environment	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
Total Credits		13

Global Business

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
Offered as a second major only
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/global-business/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/global-business/>)

Second Major Requirements

Major: Global Business

Required Credits: 40

I. Primary Major Requirement

Global Business is offered as a second major only. Students may pursue Global Business after declaring and being admitted into one of the College of Business' primary professional programs of Accounting, Business Administration, Finance, Management, Management Information Systems, or Marketing (see admission requirements (<https://www.ndsu.edu/business/>) for *all* College of Business majors).

II. Core Requirement

Code	Title	Credits
I. Core Requirement		
FIN 320	Principles of Finance	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
MIS 320	Management Information Systems	3
BUSN 430	Legal and Social Environment of Business	3
BUSN 340	International Business	3
BUSN 341	Global Business Environment (or a UNIV 492 study abroad course) *	3
BUSN 489	Strategic Management	3
Complete 3 courses from the following:		9
MRKT 372	Global Retailing	
MGMT 440	International Management	
FIN 440	International Finance	
MRKT 440	International Marketing	
BUSN 440	International Business Law	
ENTR 440	International Entrepreneurship	
AGEC 371	Export Management	
II. Language Proficiency Requirement **		3-14

III. Study Abroad Requirement ***

3

Total Credits**39-50**

- * The intent of BUSN 341 is to ensure that students participate in a study abroad experience that includes an academic component related to the country where the study abroad takes place. In addition to BUSN 341, BUSN 394: Individual Study (Global Business Environment) may also fulfill this requirement. Univ 492 (Study Abroad), NDSU Study Tour (Prefix 379) courses from across campus (faculty directed experience or field study in a foreign country) or other study abroad transfer courses approved by the department chair may also fulfill this requirement.
- ** A second year language proficiency at the college-level is required. Completion of any 300 or 400 level language course with a grade of B or higher will also fulfill this requirement. For non-native English speakers, completion of any 300 or 400 level ENGL course (this includes ENGL 320) with a grade of B or higher will fulfill this requirement.
Second Year Language Proficiency includes:
(Prefix) 101: First Year Language I
(Prefix) 102: First Year Language II
(Prefix) 201: Second Year Language I
(Prefix) 202: Second Year Language II
- *** International students who are enrolled at NDSU will not be required to complete a study abroad experience. Instead, students must complete one of the following North American history courses: HIST 382, 421, 422, 423, 424, 425, 429, 431, 434, 436, 437, or 476. This history course will substitute for the BUSN 341 "European Business Environment or equivalent study abroad course" from course requirement group A.

Degree notes:

Pre-Business Core Suggestions: While not required, students are encouraged to take either ANTH 111 (Introduction to Anthropology) or COMM 216 (Intercultural Communication) as a general education cultural diversity requirement option. Students will also benefit from taking GEOG 161 (World Regional Geography) as an elective.

Global Business

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/ (<http://www.ndsu.edu/business/>)
- **Credential Offered:**
Offered as a second major only
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/global-business/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/global-business/>)

Global Business is offered as a second major program of study only. This second major combines global business courses with language training and a study abroad experience to qualify students for management positions in the diverse, multicultural, and global environment they will encounter in the future. A second major in Global Business serves as a competence and skill amplifier for business students, complimenting their primary business major (i.e., accounting, business administration, finance, management, marketing, and management information systems). Students with this second major distinguish themselves in ways that they develop functional competencies from their primary business major and are prepared to lead and perform in multicultural and global business contexts through their second major. The Global Business major enhances students' ability to operate in global business environments, appreciation for different cultures, and business knowledge pertaining to international arenas.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

Global Business is a second major, which may only be added to a primary major from the College of Business (i.e., accounting, business administration, finance, management, marketing, or management information systems). The curriculum of this major is designed to prepare students to survive and thrive in today's global and multicultural work environment. This is achieved through global learning, both in the domestic classroom

and through study abroad opportunities around the world. The focus is to help develop more globally minded students who can communicate effectively across cultures, who are more open to diversity, who become more inter-culturally proficient, and who are aware of business issues in the international arena. The global business second major requires students to have at least 3 credits of study abroad and 2nd –year language proficiency in addition to a group of internationally oriented business electives. To complete the program requirements of Global Business as a second major, students need to complete the requirements of both the global business major and their primary business major.

Selective Admission

Students who wish to study global business at NDSU enroll as pre-professional students of their primary major in the College of Business for the first semester of their freshman year. Admission to the professional program requires the successful completion of the pre-professional course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.5, and declare Global Business as their second major. Transfer students may also be eligible for immediate admission in the professional program. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified to teach in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their business practice, challenges, and issues.

The Practicum

Students are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect business concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a second major in global business in addition to their primary business major (i.e., accounting, business administration, finance, management, marketing, or management information systems) have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Initial employment opportunities are likely tied to their primary business major with global business competencies serving as their distinctive career enhancer.

The College

In addition to global business major, the College of Business offers undergraduate majors in accounting, business administration, finance, management, marketing, and management information systems. The College of Business also offers six graduate programs including Master of Business Administration, Master of Accountancy, Master of Science in Business Analytics, Master of Managerial Logistics, Master of Transportation and Urban Systems, and Doctorate in Transportation and Logistics.

High School Preparation

It is recommended that high school students interested in studying global business at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be of benefit. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the professional program. Please speak with a professional advisor in the College of Business for more information.

Health Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/health-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/health-education/>)

The health education major is designed to prepare students for careers in the field of school health education through the development of dispositions, knowledge and skills. The program integrates classroom and experiential community-based learning throughout its courses.

The Program

The health education program emphasizes a student-centered approach to teaching health, emphasizing skills based learning to promote health literacy for all individual students.

Upon completion of the health education major, teacher candidates will be knowledgeable with planning, implementing, administering all ten components of the Whole School, Whole Community, Whole Child Model. Health education teacher candidates will learn how to evaluate and assess needs for health education, plan and implement quality curriculum and lessons and communicate and advocate for health and health education through all ten content components. Candidates in the health education major are prepared to teach health to students in grades 5-12 and 7-12 with creativity and confidence.

Professional Education Courses

Students may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, students must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced health teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates student teachers so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

An academic advisor works individually with health education teacher candidates to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentssuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in health in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP). and approved by the North Dakota Education Standards and Practices Board (ESPB)

Career Opportunities

Graduates in health education find career opportunities teaching health education in a variety of public and private educational settings, including K-12 schools, community programming, nonprofit organizations and private businesses.

Double Major – It is recommended that health education teacher candidates obtain a degree enhancement through a minor or double major. The health education curriculum has been structured to allow teacher candidates to obtain a physical education major during the same four year time frame. Advisors can provide additional information about other complementary majors or minors.

Physical Education Major – For further information about the physical education major, please refer to the Physical Education fact sheet.

Sample Program Guide - HE Major

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
HNES 110*		3 HNES 217*	3
Humanities/Fine Arts		3 ENGL 120	3
PSYC 111		3 Science/Tech	3
Quantitative Reasoning		3 Elective	3
		15	15

Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 HNES 250 ^{Requires a grade of C+}	3
EDUC 322		3 HNES 341 [*]	3
Humanities/Fine Arts		3 PSYC 210 ^{**}	3
Science/Tech w/ Lab		4 PSYC 250 or HDFS 230	3
Electives		3 Elective	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		16	15
Third Year			
Fall	Credits	Spring	Credits
HNES 367 [*]		3 EDUC 489	3
PSYC 212 ^{**}		3 HNES 345 [*]	3
Science/Tech		3 EDUC 451	3
Electives		6 Upper Division Writing	3
		Electives	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (Health Section) ^{**}		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
Electives		10 EDUC 488	3
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
		16	13
Total Credits: 120			

* Students must earn a "B" or better in all courses identified with an asterisk (*).

** Students must earn a grade of "C" or better in all course identified with a double asterisk (**).

+ Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts and/or Science/Technology categories.

Sample Program Guide - Health Education & Physical Education Double Major

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
HNES 110 [*]		3 ENGL 120	3
HNES 255 [*]		3 Science/Tech w/ Lab	4
PSYC 111		3 Quantitative Reasoning	3
Science/Tech		3 Humanities/Fine Arts	3
		15	16

Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 HNES 250**	3
EDUC 322		3 HNES 217*	3
HNES 211		1 HNES 257*	3
HNES 254*		3 HNES 341*	3
HNES 256*		3 PSYC 210***	3
Humanities/Fine Arts		3 Science/Tech	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		16	18
Third Year			
Fall	Credits	Spring	Credits
HNES 301**		3 EDUC 489	3
HNES 336**		3 HNES 345*	3
HNES 367**		3 HNES 350*	3
PSYC 212***		3 HNES 353*	3
EDUC 451 (PE section)*		3 Upper Division Writing	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (Health Section)***		3 EDUC 485	1
EDUC 481 (PE Section)***		3 EDUC 487	9
EDUC 486		3 EDUC 488	3
HNES 461*		3	
PSYC 250 or HDFS 230		3	
Apply for Student Teaching			
Complete PLT (grades K-12) Exam			
Complete Subject Area Assessment Exam			
		15	13
Total Credits: 123			

* Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).

*** Students are required to earn a "C" or better in courses marked with three asterisks (***)

- Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts and/or Science/Technology categories

Health Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/health-education/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/health-education/>)

Major Requirements

Major: Health Education

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Health Education Requirements		
HDFS 230 or PSYC 250	Life Span Development ^{**} Developmental Psychology	3
HNES 217	Personal and Community Health (May satisfy general education category W) [*]	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Teaching Specialty Requirements		
HNES 110	Introduction to Health and Physical Education [*]	3
HNES 250	Nutrition Science ^{**}	3

HNES 341	Psychosocial Aspects of Health *	3
HNES 345	Materials and Concepts of Health Education *	3
HNES 367	Principles of Conditioning **	3
HNES 445	Organization and Administration of Coordinated School Health Programs *	3
PSYC 210	Human Sexuality **	3
PSYC 212	Psychological Aspects of Drug Use and Abuse **	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Health Ed K-12) **	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		64

* Students must earn a grade of 'B' or better in these courses.

** Students must earn a grade of 'C' or better in these courses.

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required to stay in full standing in the program, for placement in student teaching, and to exit from the program.
- A GPA of 2.75 or better in professional education requirements and completion of Praxis II and PLT exams, are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Health Services

Department Information

- **Department Location:**
Sudro Hall
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/health-services/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/health-services/>)

The Bachelor of Sciences in Health Services (BSHS) is a degree offered by the College of Health Professions. The BSHS degree includes a mix of academic and technical training that meets the needs of regional health care employers. The degree is designed to provide an efficient, flexible, and technically relevant path to a four-year degree, which allows students to pursue entry-level employment in a health care setting and/or prepare for graduate/advanced professional-level training programs. Individuals who hold an associate degree, technical degree, or professional certification, and who currently work in a health care setting will also find the program to be a flexible degree completion program that facilitates career advancement.

The Program

The BSHS program has broad requirements, and allows students tremendous flexibility to tailor their plan of study to meet their unique career interests. To earn the degree, students must complete:

- 120 or more credits (125-130 credits is strongly encouraged)
- 37 or more credits at the 300 level and higher
- All NDSU General Education Requirements
- All NDSU Residency Requirements (Applicable to Transfer Students)

Additionally, students must complete the following courses:

- CHP 190, Critical Thinking and Academic Success (2 credits)
- CHP 300, Introduction to the U.S. Healthcare System (3 credits)
- CHP 301, Research Methods in Health Services (3 credits)
- CHP 391, Catholic Healthcare Ethics (3 credits)*
- CHP 489, Health Services Capstone (1 credit)
- PH 101, Introduction to Public Health (3 credits)
- Select one course from the following (3 credits)**
 - CHP 321, Perspectives for Wellness
 - CHP 325, Clinical Applications of Genetics
 - CHP 400, Interprofessional Health Care Practice
 - PH 474, Epidemiology
 - CHP 450, Complementary and Alternative Therapies
 - CHP 460, Advanced Writing for Health Professionals
 - CHP 479, Global Seminar (must be 3 or more credits)
 - CHP 491, Seminar on Catholic Health Care Ethics II

*If approved by the Program Director, students may substitute an alternative 3 credit ethics course for CHP 391.

**Students must meet existing prerequisites to enroll in any of these courses.

- 15 or more credits of coursework emphasizing clinical, research, or internship experiences. Students must complete at least 6 of the 15 clinical, research, or internship credits at the 200 level (or lower).

Students are required to meet with their academic advisor to create a plan of study that addresses all program requirements. The plan must be approved by the student's advisor and the College of Health Professions' Dean's Office at least one semester prior to graduating with the BSHS degree.

Experiential Training

A core element of the BSHS degree is that students gain hands on learning experiences that prepare them for their own, unique health care career. Students must complete at least 15 credits of approved experiential training, although students are highly encouraged to complete additional experiential credits. As previously noted, those experiences may be based in research, clinical work, or general internship experiences.

Students may complete experiential credits offered by the College of Health Professions, other departments at NDSU, other colleges and universities in the Tri-College system (i.e., NDSU, Minnesota State University Moorhead, Concordia College, North Dakota State College of Science, and Minnesota State Community and Technical College), and other North Dakota University System campuses. Experiential credits offered through the College of Health Professions will include both research opportunities, as well as opportunities to complete clinical experience credits at hospitals and health systems within the region.

While students have tremendous flexibility in selecting their experiential training, each college/university, academic department, and clinical site may have additional requirements (or assess tuition that differs from NDSU) to complete those experiences. Students are strongly encouraged to meet with their academic advisor to ensure that all academic prerequisites and professional requirements necessary to enroll in their intended experiential education courses are met.

Students who hold an associate degree, technical degree, or professional certification in a health-related field may, upon approval from the student's advisor and the College of Health Professions' Dean's Office, use those previously earned credits to satisfy BSHS experiential training requirements.

Career Opportunities

Regional and national workforce estimates indicate an increased need for qualified physicians, physician assistants, medical records and health information management personnel, as well as a variety of technically oriented health care workers between now and 2026. North Dakota job growth percentages for different areas (2014-2024) compared to national (2016-2026) suggest similar workforce needs (U.S. Department of Labor projections (<https://projectionscentral.com/Projections/Download/>) and US Bureau of Labor Statistics Healthcare Occupation Outlook (<https://www.bls.gov/ooh/healthcare/home.htm>)):

- Physicians: North Dakota 8%; National 15%
- Physician Assistants North Dakota 31%; National 37%
- Cardiovascular Technologists/Technicians: North Dakota 34%; National 10%
- Surgical Technologists: North Dakota 24%; National 12%
- Medical Laboratory Technologists: North Dakota 25%, National 12%
- Medical Records and Health Information Technologists: North Dakota 23%, National 13%

Many entry-level health care careers require a unique mix of traditional academic and professional/technical education, which are not included in any current degree offerings at NDSU. Students may obtain this training in graduate and/or professional programs (pharmaceutical sciences, public health, etc.) or at community and technical colleges (surgical technology, health information technology, etc.). The BSHS degree provides students flexibility in planning to meet the unique academic requirements of their professional/graduate/technical program of interest while completing a well-rounded bachelor degree.

Transferring Credits

View NDSU equivalencies of transfer courses at: www.ndsu.edu/transfer/equivalencies (<http://www.ndsu.edu/transfer/equivalencies/>)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CHP 190		2 PH 101	3
ENGL 110		3 ENGL 120	3
Gen Ed Humanities & Fine Arts		3 Gen Ed Science & Tech w/ Lab	4
Gen Ed Science & Tech		3 Gen Ed Social & Behavioral Sciences	3
Gen Ed Quantitative Reasoning		3 Health Services Major-Specific Electives	2
		14	15
Second Year			
Fall	Credits	Spring	Credits
COMM 110		3 Clinical, Research or Internship Requirements (100-200 level)	3
Gen Ed Humanities/Fine Arts		3 Health Services Major-Specific Electives	12
Gen Ed Science and Technology		3	
Gen Ed Social & Behavioral Sciences & Global Perspectives		3	
Clinical, Research or Internship Requirements (100-200 level)		3	
		15	15
Third Year			
Fall	Credits	Spring	Credits
CHP 300		3 CHP 301	3
Gen Ed Upper Division Writing		3 Clinical, Research or Internship Requirements (300-400 level)	3
Clinical, Research or Internship Requirements (300-400 level)		3 Health Services Major-Specific Electives (300-400 level)	9
Health Services Major-Specific Electives		6	
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
Clinical, Research or Internship Requirements (300-400 level)		3 CHP 401	3
CHP 400		3 CHP 489 Capstone	1

Health Services Major-Specific Electives (300-400 level)	9 Health Services Major-Specific Electives	12
	15	16

Total Credits: 120

Health Services

Department Information

- **Department Location:**
Surdo Hall
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/health-services/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/health-services/>)

Major Requirements

Health Services Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Major Requirements

Code	Title	Credits
CHP 190	Critical Thinking and Academic Success	2
PH 101	Introduction to Public Health	3
CHP 300	Introduction to the U.S. Health Care System	3
CHP 301	Research Methods in Health Services	3
CHP 391	Seminar (Fundamentals of Catholic Healthcare Ethics or other approved ethics course)	3
CHP 400	Interprofessional Health Care Practice (or other approved course)	3
CHP 489	Health Services Capstone	1

Health Services Major-Specific Electives	31
Health Services Major-Specific Electives (300-400 level)	10
Clinical, Research or Internship Requirements (100-200 level)	6
Clinical, Research or Internship Requirements (300-400 level)	9
Total Credits	74

History

Department Information

- **Department Location:**
Minard Hall 422
- **Department Phone:**
701-231-8654
- **Department Web Site:**
www.ndsu.edu/history/ (<http://www.ndsu.edu/history/>)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/history/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/history/>)

History is the key to the present. This important fact is sometimes overlooked by some members of America's present-minded society. If one is to understand the present and approach the future intelligently, it is necessary to have a clear understanding of the past. Indeed, the present is the direct result of the past, and the great issues of the day can be dealt with competently only by use of the perspective provided by the past.

Background Information

History is the keystone to a liberal arts education because everything is intimately related to history. It acts as a unifying agent that helps link other liberal arts courses together in a meaningful whole. But for many students who have an intense interest in history, the crucial question remains: "What is the job outlook for a history major?"

Career Opportunities

The skills and attitudes fostered by a history-oriented education can lead to careers in business, law, industry, government or teaching. These skills include the ability to analyze, communicate effectively, reason and think critically. They help provide insight into the complexity of human behavior.

Many students who major in history at North Dakota State University combine their history courses with an approved minor and pursue the Bachelor of Science (B.S.) degree. Graduates have found jobs in such business fields as insurance and retailing. Opportunities also exist in banking, health services, and local and state government.

A second option is the Bachelor of Arts (B.A.) degree, which includes foreign language study. This degree program is recommended for students desiring a rich liberal arts education or planning to attend graduate school or law school. Recent graduates have entered graduate programs at the Universities of Florida, Nebraska and Texas. Many history majors go on to earn a law degree and practice law in North Dakota and other states.

Additional career options are outlined on the "Career Information" link on the history department website. More information on career opportunities in history can be found in the Occupational Outlook Handbook published by the U.S. Department of Labor.

The Program

Each of the degree programs requires basic courses in such areas as English, social and behavioral sciences, and science and mathematics. In addition, each program has a distinctive requirement—an approved minor for the B.S., foreign language proficiency at the second-year level for the B.A. and 30 credits in specified education courses for the history education degree. The curriculum in these degree options includes a variety of courses in North American, European and world history. After taking introductory courses, students majoring in history work with their advisers in selecting an interrelated sequence of upper-division courses.

A total of 39 credits in history are required in each of the options. Each option requires nine to 15 credits at the 100-200 level, a historical research and writing course and at least 18 credits in 300- or 400-level courses. Eighteen of the credits at the 300-400 level must meet geographic distribution requirements. A three-credit senior seminar is required of all history majors as a capstone experience.

Public History Major

In 1982, the Department of History launched a public history program, the first in the Upper Midwest, which introduces students to such fields as archival and museum work. Public History is now a vibrant field of study in the United States and trains students for a wide variety of careers. The Public History major is a 51 credit professional major. More information can be found on the history department web page.

Multimedia Lectures

History faculty incorporate multimedia presentations into many of their introductory classes. Some faculty work extensively with computer-aided teaching in the multimedia lecture halls to increase the visual impact and student learning from their lectures.

Active Learning in Classes

The department encourages active learning in many of its introductory classes by using techniques that include student portfolios, in-class exercises, role playing, computer simulations and library assignments. Faculty make prudent use of technology and encourage the examination of all sorts of primary sources, including films, novels and textiles as well as government documents and memoirs.

International Perspectives and Cultural Diversity

The department is strongly committed to helping students understand the diversity of human experience. In addition to the specific courses in non-western areas, other history classes help students understand how differences in race, gender, ethnicity, and social and economic class have affected people's lives. Department faculty are also active in numerous efforts to promote understanding of diversity. These include women's studies and NDSU's anti-racism team. The department encourages study abroad, and NDSU historians have designed programs in Vienna and Mexico City.

The Faculty

Each member of the NDSU history faculty of ten holds a doctorate from a leading university, among them UCLA, Cornell, Indiana University, Northwestern, and Notre Dame. Faculty members provide a wide range of academic experience and specialties. They have published books and articles on subjects such as Great Plains, Environmental History, pre-colonial Latin America, 20th-century Indochina, American women and families, the American Revolutionary War, Early Modern Europe, and Eastern Europe under communist rule. History faculty members frequently present scholarly research papers at professional historical conferences in various centers of learning. Faculty members have won college, university, state and national awards for their research. The department also hosts regional history conferences and lectures.

History Department Affiliate

The North Dakota Institute for Regional Studies is closely connected with the Department of History, Philosophy, and Religious Studies. The Institute collects, organizes and preserves materials on our region's historical heritage.

Cooperation with Humanities Council and the National Endowment for the Humanities

History faculty are active in programs sponsored and funded by the North Dakota Humanities Council. In recent years, faculty have written and presented on genocide in Bosnia, suicide and divorce in the Civil War South, the Dakota War of 1862 and French Colonial policies in Indochina.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
HIST 101 or 103 (Foundation Course & Gen Ed Humanities)		3 HIST 102 or 104 (Foundation Course & Gen Ed Humanities)	3
ENGL 110		3 COMM 110	3
Gen Ed Social & Behavioral & Global Perspectives		3 ENGL 120	3
Gen Ed Quantitative Reasoning		3 AHSS College Humanities Requirement	3
Gen Ed Wellness		2 Gen Ed Science & Technology w/ Lab	4
		14	16
Second Year			
Fall	Credits	Spring	Credits
Transitional Course		3 HIST 281	3
AHSS College Fine Arts Requirement		3 Gen Ed Science & Technology	3
Gen Ed Science & Technology		3 Gen Ed Humanities & Fine Arts	3

Gen Ed Social & Behavioral Sciences and Cult Diversity	3	AHSS College Social Sciences Requirement	3
Distribution Req No. American History	3	Minor	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
HIST 390 (Gen Ed Upper Division Writing)		3 Distribution Req European History	3
Distribution Req No. American History		3 Distribution Req Widening Horizons	3
Distribution Req European History		3 Minor	3
Minor		3 Minor	3
Free Elective		4 Free Elective	3
		16	15
Fourth Year			
Fall	Credits	Spring	Credits
HIST 489 (Capstone)		3 Minor	3
Distribution Req Widening Horizons		3 Minor	3
Required History Electives		3 Free Electives	8
Required History Electives		3	
Free Elective		3	
		15	14

Total Credits: 120

Program Note: 24 credits must be taken at the 300-400 level and 20 credits must be taken in residence at NDSU for the history major.

History

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
ndsuhrs.org/ (<http://ndsuhrs.org/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/history/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/history/#planofstudytext>)

Major Requirements

Major: History

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Twenty-four (24) credits must be taken at the 300-400 level and of these 24, twenty (20) credits must be taken in residence at NDSU for a history major.

Code	Title	Credits
History Major Requirements		
Foundation Core: Select 2 courses from the following:		6
HIST 101	Western Civilization I (May satisfy general education category A)	
HIST 102	Western Civilization II (May satisfy general education category A)	
HIST 103	U.S. to 1877 (May satisfy general education category A)	
HIST 104	U.S. Since 1877 (May satisfy general education category A)	
Research & Writing		
HIST 390	Historical Research and Writing	3
Transitional Courses: Select one course from the following:		3
HIST 135	Race in U.S. History (May satisfy general education category A and D)	
HIST 220	North Dakota History	
HIST 251	Introduction To Public History	
HIST 252	Introduction to Museum Work	
HIST 259	Women in European History 1400-1800	
HIST 261	American Indian History (May satisfy general education category A and D)	
HIST 270	American Religious History (May satisfy general education category A)	
HIST 271	Introduction to Latin American History (May satisfy general education category A and D)	
HIST 280	History of East Asia to 1600	
HIST 281	History of East Asia from 1600	
Distribution Requirement: Minimum credit required for each distribution area.		
North American History: Select 6 credits from the following:		6
RELS 340	New Religious Movements	
RELS 345	Religion and Politics	
HIST 382	Canada	
HIST 415	Public Memory and Memorialization in America	
HIST 420	Colonial American History	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 426	Women in American History	
HIST 428	War and Society in Early America	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	
European History: Select 6 credits of the following:		6
HIST 320	History of Christianity	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455	The Eighteenth Century	
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	
HIST 465	Germany since 1750	
HIST 467	History Of Russia II	

Widening Horizons: Select 6 credits of the following: 6

HIST 355	History of Global Islam
HIST 381	Australia & New Zealand (May satisfy general education category A and G)
HIST 440	The Ottoman Empire
HIST 473	Colonial Mexico
HIST 474	Modern Mexico
HIST 475	The Aztec, Maya, and Inca
HIST 477	Slavery in the Atlantic World
HIST 480	History of Modern China from 1600
HIST 481	History of Japan
HIST 482	Vietnam: 125 Years of Conflict
HIST 484	Cultures and Civilizations of the Pre-modern World
HIST 485	Cultural Exchange and the Making of the Modern World

Senior Seminar:

HIST 489	Senior Seminar (Capstone) *	3
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Additional Electives: A minimum of 6 credits of history courses required. 6

Total Credits 39

* Prerequisite for HIST 489 Capstone: HIST 390

Minor Requirements

Minor: History

Required Credits: 18

Code	Title	Credits
Electives		
HIST	100-200 level courses	9
HIST	300-400 level courses	9
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

History Education

Department Information

- Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- Department Phone:**
701-231-7921
- Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- Credential Offered:**
B.S.; B.A.
- Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/history-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/history-education/#planofstudytext>)

Major Requirements

Major: History Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
History 100-200 Level Courses		9
History 300-400 Level Courses		9
HIST 390	Historical Research and Writing (May satisfy general education category C)	3
HIST 489	Senior Seminar (Capstone)	3
Distribution Requirement: Select 6 credits from each of the 3 categories.		18
North American History (6 cr):		
HIST 382	Canada	
HIST 421	Revolutionary America	
HIST 422	American Civil War and Reconstruction	
HIST 423	The Gilded Age and Progressive America	
HIST 424	U.S. History 1917-1960	
HIST 425	U.S. History 1917-Present II	
HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	

HIST 426	Women in American History	
HIST 415	Public Memory and Memorialization in America	
HIST 420	Colonial American History	
European History (6 cr):		
HIST 320	History of Christianity	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 454	Renaissance And Reformation	
HIST 455	The Eighteenth Century	
HIST 456	Europe 1815-1914	
HIST 457	Europe Since 1914	
HIST 465	Germany since 1750	
HIST 464	Imperial Spain	
HIST 467	History Of Russia II	
HIST 452	The Viking Age	
HIST 652	The Viking Age	
Widening Horizons (6 cr):		
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 474	Modern Mexico	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
Additional Major/Minor/Electives		9
Of these nine credits, at least one course in political science, geography, economics, sociology, anthropology or psychology is required beyond the introductory level.		
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Soc Sci)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		82

Degree Requirements and Notes

- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.

History Education

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/history-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/history-education/>)

The Program

The History education curriculum includes classes in the various fields of history, namely European history, US history, and Widening Horizons (world history). Candidates in the history education major are prepared to teach a diverse curriculum to a diverse student population.

THE PROGRAM

Candidates in the history education major are prepared to teach history to students in grades 5-12 with creativity and confidence. The history education teacher candidate should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate multiple learning styles.

Professional Education Courses

Teacher candidates may enroll in 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and in education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced history teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

An academic advisor works individually with history education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible to teach history in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

In general, "employment of high school teachers is projected to grow 8 percent from 2016 to 2026, about as fast as the average for all occupations. Rising student enrollment should increase demand for high school teachers, but employment growth will vary by region".

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 110		3 ENGL 120	3
ENGL 110		3 Quantitative Reasoning	3
Science & Technology		3 Wellness	2-3

Social/Behavioral Science	3	HIST 100-200 Elective/ Social/ Behavioral Science Gen Ed (HIST 101, 102, 103, 104, 135, 261, 270, or 271)	3
HIST 100-200 Elective/ Social/ Behavioral Science Gen Ed (HIST 101, 102, 103, 104, 135, 261, 270, or 271)	3	POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective	3
15		14-15	
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 EDUC 322	3
Science & Technology		3 Science & Technology w/Lab	4
HIST 100-200 Elective/ Culural Diversity Gen Ed (HIST 135, 261, or 271)		3 Social/Behavioral Science	3
HIST 300-400 Widening Horizons Elective		3 HIST 300-400 Elective/ Global Perspective Gen Ed (HIST 351 or 355)	3
POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective		3 HIST US 300-400 Elective	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
15		16	
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 EDUC 489	3
HIST 300-400 Elective		3 HIST 300-400 Elective	3
Hist European 300-400 Elective		3 HIST European 300-400 Elective	3
HIST US 300-400 Elective		3 HIST 390	3
POLS/GEOG/ECON/SOC/ANTH/ PSYC Elective		3 Elective	4
15		16	
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
HIST 300-400 Widening Horizons Elective		3 EDUC 488	3
HIST 489		3	
Elective		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
15		13	

Total Credits: 119-120

Honors Program

Department Information

- **Department Phone:**
701-231-7131
- **Department Web Site:**
www.ndsu.edu/honors/ (<http://www.ndsu.edu/honors/>)
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/honors-program/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/honors-program/>)

IMPORTANT NOTE: The Honors Program is undergoing some changes so new students are currently not being accepted into the program. Current NDSU Honors students are able to complete the Honors minor. Please work with the Honors Council Representative from your College for advising. A list of contacts can be found on the University Honors Program website (<https://www.ndsu.edu/honors/>).

The Honors Program at North Dakota State University provides a signature experience for motivated students with exceptional academic potential. The program combines interdisciplinary coursework, an honors capstone project, experiential learning and leadership development.

The requirements for the Honors Program can be integrated into the curriculum of any major on campus. The program is not simply a harder version of an existing major. Honors students complete 16 credits designed to develop their critical thinking and problem-solving skills.

Honors Minor

Students who complete the required 16 credits will receive a minor in honors. Students must complete 6 credits of required HON courses, 6 honors elective credits and 4 credits for the Honors capstone project.

Interdisciplinary Coursework

Honors courses are small interactive classes of no more than twenty-five students. The classes promote student-centered discussion and the development of analytical and communications skills. All honors courses are designed specifically for the honors program and are not harder versions of other classes. First year honors courses introduce students to the unique atmosphere of the honors classroom as well as the student-centered design of the courses. After the first year, students have the opportunity to explore topics in greater depth in upper-division colloquia. In these upper-level courses students might find themselves discussing the politics of radicalism, the impact of science on society or even engaging in drone photography.

Honors Capstone Project

All students in the Honors program must complete the honors capstone project. The honors capstone project is the culmination of the Honors experience. Honors students will work with a faculty mentor to design and carry out the project. Students can complete a research thesis, online portfolio, experiential-based project, creative/performative project or an innovation project.

All projects should be conceptualized as a project that cannot be completed within the confines of one class or one semester. This means that the project should be sufficiently broad in scope and in-depth in analysis. Students can select one of five options for the Honors capstone project.

Experiential Learning and Leadership Development

Experiential learning is geared toward achieving leadership skills. The leadership development curriculum is based on strengths-based leadership and developing the National Association of Colleges and Employers competencies for success in the workplace. In the Leadership Development course, honors students both develop leadership skills and prepare to become peer mentors for incoming freshmen honors students. Juniors and Seniors in the program can serve as peer mentors for first year honors students.

Honors Program

Department Information

- **Department Location:**
Library 06
- **Department Phone:**
701-231-9616
- **Department Email:**
ndsu.honors@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/honors/ (<http://www.ndsu.edu/honors/>)

- **Credential Offered:**
Minor

Minor Requirements

Minor: Honors Program

Required Credits: 16

Minor Requirements

Code	Title	Credits
Core Requirements		
HON 151	Sapien Logic	3
HON 193	Undergraduate Research	1
HON 251	Leadership Development	2
Honors Electives - Select 6 Credits from the following:		6
HON 340	Colloquium in the Humanities	
HON 341	Colloquium in the Social Sciences	
HON 342	Colloquium in the Sciences	
ART 380	Topics in Photography	
HON 391	Seminar	
HON 396	Field Experience (1-3 credits)	
UNIV 492	Study Abroad (1-3 credits)	
HDFS 494	Individual Study	
HDFS 496	Field Experience	
Graduate Level Course ¹		
Honors Capstone Project		4
HON 491	Seminar	
HON 489	Senior Thesis (2 credits)	
or HDFS 496	Field Experience	
or HDFS 491	Seminar	
Select one from the following:		
HON 494	Individual Study	
HDFS 494	Individual Study	
Prefix 393 or 493	Undergraduate Research (1 credit) ²	
Total Credits		16

¹ Students must submit a proposal to take a graduate level course as a junior with the intent to complete the course as a senior. Students will work with their program advisor to ensure all Graduate School paperwork is complete.

² Students must take at least 1 research credit in the department of the thesis advisor. The course can be any prefix.

Honor Capstone Project Notes

- Students in the Honors program must complete the honors capstone project to complete the honors minor. The honors capstone project is the culmination of the Honors experience. Students will work with a faculty mentor to design and carry out the project. Students may complete a research thesis, online portfolio, experiential-based project, creative/performative project or an innovation project.
- Projects should be conceptualized as a project that cannot be completed within the confines of one class or one semester. This means that the project should be sufficiently broad in scope and in-depth in analysis. Students can select one of five options for the honors capstone project.

Horticulture

Department Information

- **Department Location:**
Loftsgard Hall
- **Department Phone:**
701-231-7971
- **Department Email:**

ndsu.plantsciences@ndsu.edu

- **Department Web Site:**

www.ag.ndsu.edu/plantsciences/undergraduate/horticulture (<http://www.ag.ndsu.edu/plantsciences/undergraduate/horticulture/>)

- **Credential Offered:**

B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/horticulture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/horticulture/>)

Horticulture is the science and art of producing, improving, marketing, and using fruits, vegetables, flowers, and landscape plants. It differs from botany and other plant sciences in that horticulture incorporates both science and art. Horticulture is an art as old as the ancient gardens and a science as new as today's genetic engineering. Horticulture is an industry, profession, business, vocation and avocation. Production and consumption of high quality fruits and vegetables allows us to maintain a healthy, balanced daily diet. Flowers and ornamental plants enrich our homes and communities, and contribute to our sense of well-being. Horticulture impacts our lives on a daily basis by providing nutritious fruits and vegetables, offering visual enjoyment, and promoting recreational activities.

The Program

The Department of Plant Sciences offers a four-year curriculum in horticulture leading to the Bachelor of Science degree. There are six horticulture options: horticulture science, landscape design, landscape management, production-business, sports and urban turfgrass management, and urban forestry and parks.

Career Opportunities

Production – producers of horticultural food crops for fresh consumption or processing; nursery and greenhouse production of food and ornamental crops; field positions for processing, marketing and seed companies; and plant propagation/tissue culture specialists. Salaries range from \$35,000 - \$80,000

Landscaping – planners, designers and installers of residential, commercial, public and recreational landscapes (both exterior and interior), employment with nurseries, landscape management and maintenance firms or private consultants. Salaries range from \$35,000 - \$80,000

Arborist or Urban Park Forester – selection, planting and management of woody plants in urban environments. Salaries range from \$36,000 - \$80,000

Park Management and Maintenance – positions in national, state and local park systems, botanic gardens and arboreta

Golf Course Superintendent – professional manager who manages the labor, time, materials and financial resources needed to care for the turfgrass and landscaped grounds on a golf course. Starting as an assistant, it is possible for a graduate to become a full-fledged golf course superintendent in three to five years. Starting salaries range from \$28,000 to \$35,000, with the national average of head superintendents reaching more than \$80,000

Sports Turf Management – professional manager that is entrusted with the operation and management of sports fields and facilities. Sports fields include baseball, football, soccer, lacrosse, rugby, lawn bowling and cricket. The average salary of a sports turf manager is about \$44,000.

Lawn Care Operator – professional manager responsible for the cultivation and care of the landscaping and grounds surrounding a business or building. Lawn care operators comprise the largest single group of potential career opportunities for the graduate with more than 6,000 companies in the United States servicing millions of American lawns at the residential, commercial and institutional levels. Salaries range from \$35,000 - \$80,000

Facility Managers – professional manager that maintains the buildings and grounds of an organization, directing staff and overseeing the upkeep of equipment and supplies. Facilities managers make sure the buildings and grounds are maintained, which entails daily and weekly reduction improvements and safety inspections

Marketing – positions in the retail/wholesale distribution of horticultural products and buying, selling and distribution of supplies and products used by the horticultural industries

Industry – management and sales positions in horticulture or allied firms for fertilizers, seed, food and ornamental crops, pesticides, equipment, processing and packaging

Inspection – field diagnosticians and inspectors for fresh and processed products in federal or private agencies

Research – positions at public and private institutions as technicians in field and laboratory research. Areas of research include horticultural plant breeding, pesticide evaluation, crop physiology, product testing and quality control, plant propagation and biotechnology

Communication – writers/editors for television, radio, magazines and newspapers

Teaching and Extension – extension personnel who assist growers, industry and the public through education and outreach

Graduates with master's degrees find positions in research, extension service and private industry. Teaching positions are available at community colleges, technical schools and other agriculture-related institutions.

They are also in demand for technical, supervisory and managerial positions in various horticultural industries. Graduates with doctoral degrees are qualified for teaching, research and extension positions at universities. They also may be employed for research positions by the USDA, government agencies, public and private botanical gardens and institutions, and various horticulture, breeding and biotechnology companies.

Financial Aid and Scholarships

Loans, scholarships, grants and the work-study program are available through the Office of Financial Aid and Scholarships. Students requiring financial assistance may contact the Office of Financial Aid and Scholarships or One Stop.

The Department of Plant Sciences awards 15 horticultural scholarships for use during the freshman, sophomore, junior and senior years. The Horticulture and Forestry Club awards three scholarships each year as well. Additionally, scholarships are awarded to freshmen students by the College of Agriculture, Food Systems, and Natural Resources prior to enrollment. Scholarships also are available to students continuing a major in the College. Applications for all college and departmental scholarships may be applied for online between December 1 and March 1, annually. Also, many undergraduate students are employed part-time during the school year and full-time during the summer months as research or teaching assistants.

Extra-Curricular Activities

Horticulture & Forestry Club – an opportunity for students who enjoy plants to come together and participate in fun plant related events including: collegiate contests, field trips and networking opportunities. The club meets at least monthly. Collegiate contests and exhibits provide educational and leadership opportunities. Field trips are made annually, exposing students to a diversity of horticultural enterprises and potential job opportunities. Club members propagate, grow and sell flowers and ornamental plants to finance social events, field trips and scholarships. Majors and non-majors are welcome!

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year					
Fall	Credits	Spring	Credits		
PLSC 189		1 ENGL 120	3		
ENGL 110		3 BIOL 151	3		
COMM 110		3 SOIL 210	3		
MATH 103		3 CSCI 114	3		
BIOL 150		3 Hum & Fine Arts and Cult Div Gen Ed	3		
		13	15		
Second Year					
Fall	Credits	Spring	Credits		
CHEM 121 & 121L		4 CHEM 122	3		
PLSC 210		3 ECON 105, 201, or 202	3		
PLSC 211		1 Social & Behavioral Sc Gen Ed	3		
PLSC 355		3 Option Electives	6		
Option Electives		6			
		17	15		
Third Year					
Fall	Credits	Spring	Credits	Summer	Credits
PLSC 365		2 PPTH 455 or 457	3	PLSC 496 or 494	2
PPTH 324		3 PLSC 323	3		
STAT 330		3 PLSC 380	3		
Upper Division Writing Gen Ed		3 Option Electives	6		

Option Electives	6		
	17	15	2
Fourth Year			
Fall	Credits	Spring	Credits
ENT 350	3	PLSC 457	3
Option Electives	7	PLSC 491	1
Wellness Gen Ed	2	Hum & Fine Arts and Glob Perspect Gen Ed	3
		Option Electives	6
	12	13	

Total Credits: 119

Horticulture

Department Information

- **Department Location:**
Loftsgard Hall
- **Department Phone:**
701-231-7971
- **Department Email:**
ndsu.plantsciences@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/plantsciences/undergraduate/horticulture (<http://www.ag.ndsu.edu/plantsciences/undergraduate/horticulture/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/horticulture/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/horticulture/#planofstudytext>)

Major Requirements

Major: Horticulture

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Required Core Courses for Horticulture		
PLSC 189	Skills for Academic Success ¹	1
BIOL 150	General Biology I	3
BIOL 151	General Biology II	3
PLSC 380	Principles of Plant Physiology	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
ECON 105 or ECON 201 or ECON 202	Elements of Economics (May satisfy general education category B and G) Principles of Microeconomics Principles of Macroeconomics	3
ENT 350	General Entomology	3
MATH 103	College Algebra	3
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
PLSC 215	Weed Identification	1
PLSC 355	Woody Landscape Plants	3
PLSC 365	Herbaceous Landscape Plants	2
PLSC 457	Horticulture and Turfgrass Systems (Capstone)	3
PLSC 496 or PLSC 494	Field Experience Individual Study	2
PLSC 491	Seminar	1
PPTH 324	Introductory Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Options: Select one of the six options listed below.		32-34
Option information: Students must select one of the options listed below to complete the major. The standard option is Production Business; if students wish to complete one of the other options available they must officially declare their option with the Office of Registration and Records.		
Total Credits		83-85

- ¹ PLSC 189 is only required for first-time, first-year students--A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take this course.

Production-Business Option (Standard) - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
ENT 431	Principles of Insect Pest Management	3
MGMT 320	Foundations of Management	3
MRKT 320	Foundations of Marketing	3
or MGMT 430	Leadership in Organizations	
PLSC 368	Plant Propagation	3
PPTH 455	Plant Disease Management	3
or PPTH 457	Landscape Plant Pathology	

Electives: Select 15 credits of the following: **15**

ASM 373	Tractors & Power Units
PLSC 177	Floral Design I
PLSC 296	Field Experience
PLSC 323	Principles of Weed Science
PLSC 375	Turfgrass Management
PLSC 375L	Turfgrass Management Laboratory
PLSC 412	Nursery Production and Management
PLSC 415	Vegetable Crop Production
PLSC 416	Fruit Crop Production
PLSC 422	Greenhouse Production and Management
PLSC 425	Potato Science
PLSC 453	Advanced Weed Science
PLSC 465	Advanced Landscape Plants
PLSC 484	Plant Tissue Culture and Biotechnology
PLSC 486	Applied Crop Physiology
SOIL 322	Soil Fertility and Fertilizers

Total Credits **33**

Horticulture Science Option - 33 Credits

Code	Title	Credits
BIOC 260	Elements of Biochemistry	4
CHEM 122L	General Chemistry II Laboratory	1
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146	Applied Calculus I	4
PLSC 315	Genetics	3
PLSC 315L	Genetics Laboratory	1
PLSC 368	Plant Propagation	3

Electives: Select 13 credits of the following: **13**

CLAS 180	Scientific Term: Greek & Latin
PLSC 296	Field Experience
PLSC 323	Principles of Weed Science
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory
PLSC 411	Genomics
PLSC 412	Nursery Production and Management
PLSC 415	Vegetable Crop Production
PLSC 416	Fruit Crop Production

PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 431	Intermediate Genetics	
PLSC 444	Applied Plant Breeding and Research Methods	
PLSC 453	Advanced Weed Science	
PLSC 484	Plant Tissue Culture and Biotechnology	
PLSC 485	Arboriculture Science	
PPTH 455 or PPTH 457	Plant Disease Management Landscape Plant Pathology	
SOIL 465	Soil And Plant Analysis	
STAT 331	Regression Analysis	
STAT 367	Probability	
STAT 462	Introduction to Experimental Design	
Total Credits		33

Landscape Design Option - 34 Credits

This option also requires the completion of the Landscape Architecture minor (19 credits).

Code	Title	Credits
PLSC 177	Floral Design I	2
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 465	Advanced Landscape Plants	2
Electives: Select 9 credits of the following:		9
PLSC 296	Field Experience	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
PLSC 485	Arboriculture Science	
PPTH 457	Landscape Plant Pathology	
Landscape Architecture Minor		
Core Courses		
LA 231	Digital Media + Methods Technology	3
LA 271	Introduction to Landscape Architecture Studio	6
Electives: Select 10 credits of the following:		10
LA 232	Design Technology	
LA 272	Parks & Open Spaces Studio	
LA 322	History of Landscape Architecture	
LA 341	Site Design + Development	
LA 342	Site Development and Detailing II	
LA 441	Site Development and Detailing III	
Total Credits		34

Landscape management Option - 32 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 370	Landscape Management	3
PLSC 465	Advanced Landscape Plants	2
PLSC 468	Landscape Irrigation Design	2

PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology	3
Electives: Select 12 credits of the following:		12
ENT 431	Principles of Insect Pest Management	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 368	Plant Propagation	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 480	Advanced Turfgrass Topics	
PLSC 485	Arboriculture Science	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		32

Sports & Urban Turfgrass management Option - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	4
PLSC 381	Sports Turf Operations	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PPTH 457	Landscape Plant Pathology	3
SOIL 322	Soil Fertility and Fertilizers	3
Electives: Select 10 credits of the following:		10
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ENT 431	Principles of Insect Pest Management	
HNES 128	Golf	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 296	Field Experience	
PLSC 323	Principles of Weed Science	
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 465	Advanced Landscape Plants	
PLSC 480	Advanced Turfgrass Topics	
PLSC 485	Arboriculture Science	
PPTH 455	Plant Disease Management	
SOIL 217	Introduction to Meteorology & Climatology	
Total Credits		33

Urban Forestry & Parks Option - 33 Credits

Code	Title	Credits
ACCT 102	Fundamentals of Accounting	3
MGMT 320	Foundations of Management	3
PLSC 219	Introduction to Prairie & Community Forestry	2
PLSC 386	Arboriculture Climbing and Rigging Operations	2
PLSC 465	Advanced Landscape Plants	2
PLSC 485	Arboriculture Science	3
PPTH 457	Landscape Plant Pathology	3
Electives: Select 15 credits of the following:		15
ENT 431	Principles of Insect Pest Management	

GEOG 105	Fundamentals of Geographic Information Systems	
NRM 264	Natural Resource Management Systems	
NRM 401	Urban-Ecosystem Management	
PLSC 296	Field Experience	
PLSC 315	Genetics	
PLSC 323	Principles of Weed Science	
PLSC 368	Plant Propagation	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 412	Nursery Production and Management	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
SOIL 322	Soil Fertility and Fertilizers	
Total Credits		33

Minor Requirements

Minor: Horticulture

Required Credits: 17

Minor Requirements

Code	Title	Credits
Required Courses		
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
Select two of the following courses listed below:		5-6
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 368	Plant Propagation	
Elective Courses: Select from the following:		8-9
PLSC 177	Floral Design I	
PLSC 341	Landscape Bidding, Contracting and Operations	
PLSC 370	Landscape Management	
PLSC 375	Turfgrass Management	
PLSC 375L	Turfgrass Management Laboratory	
PLSC 379	Study Tour Abroad	
PLSC 381	Sports Turf Operations	
PLSC 386	Arboriculture Climbing and Rigging Operations	
PLSC 412	Nursery Production and Management	
PLSC 415	Vegetable Crop Production	
PLSC 416	Fruit Crop Production	
PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 465	Advanced Landscape Plants	
PLSC 468	Landscape Irrigation Design	
PLSC 469	Landscape Irrigation Installation and Management	
PLSC 484	Plant Tissue Culture and Biotechnology	
PLSC 485	Arboriculture Science	
ENT 350	General Entomology	
PPTH 324	Introductory Plant Pathology	

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Hospitality and Tourism Management

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall 178
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/hospitality_and_tourism_management/ (http://www.ndsu.edu/adhm/hospitality_and_tourism_management/)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/hospitality-tourism-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/hospitality-tourism-management/>)

Are you a people-person? Are you passionate about customer service and enriching people's experiences? Do you have exceptional work ethic and enjoy a fast-paced environment? If you answered YES to any of these questions, then Hospitality and Tourism Management is a great field for you.

As the nation's number one retail employer, the hospitality and tourism industry employs millions of people. The demand for managers continues to grow as the demand for services grows. Along with this demand for services is an increasing emphasis on comfort, convenience and personalized attention. All of these factors increase the need for effective and efficient professionals to manage hospitality operations and lead teams of people.

The Program

We are the only four-year Hospitality and Tourism Management (HTM) program in North Dakota and we are accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA). The program has undergone this process to ensure students receive a quality education. The ACPHA guidelines and standards help us pursue excellence in the area of hospitality administration. The mission of the HTM program is to develop effective and efficient leaders of the hospitality and tourism industry. To achieve this mission, it is our goal that students graduating from the HTM program at NDSU will demonstrate leadership skills by having the following: knowledge of the industry, people management skills, problem solving skills, and a sense of responsibility.

- Our program incorporates a solid foundation of general education courses vital in developing a well-rounded professional.
- All students complete a core of fundamental courses on the management of people, materials, finances, technology, and time in a hospitality and tourism setting.
- Upper-division courses concentrate on project-based, critical evaluation, and production of quality services in hospitality and tourism operations.
- Students choose professional electives in areas such as food and beverage, professional club management, resorts, and convention and meeting planning. Study tour or study abroad opportunities may also count for professional electives with faculty approval.
- Students "learn by doing" through our strong emphasis on experiential learning.
- A 24-credit minor in Business Administration is required with this major. The minor provides a strong business background on which we build depth of knowledge concerning the specifics of marketing and management in the hospitality industry. Students must have an overall grade point average of 2.5 to enroll in the business administration classes.

Student Advisement

A faculty advisor is assigned to work with each student majoring in HTM. The academic advisor helps students set goals for their college work, choose courses and seek meaningful work experiences during their college career.

Work Experience and Internship

The Fargo-Moorhead and West Fargo area provides many quality hospitality and tourism operations for students to gain work experience. The majority of our students are employed by local businesses while completing their degrees. A three-credit supervised, on-the-job field experience (internship) is required for degree completion. Ideally, students complete the field experience during the summer between their junior and senior years. Placement is determined by the student's desire for type of operation and preferred geographic location.

Career Opportunities

The HTM program at NDSU provides you with a strong educational background for a variety of career options in the hospitality industry. The starting salary for a graduate in the HTM field can range from \$30,000 to \$40,000 with great possibility for increase in salary after the completion of management training. Students graduating with industry experience also may start at a higher rate.

Feed your passion and build your career in one of the following areas:

- Hotels, resorts, and other lodging operations
- Restaurants, catering, and other food and beverage operations
- Meetings, conventions, and event planning
- Travel, tourism, and transportation
- Theme parks, private clubs, and gaming operations
- Services sales and marketing

STUDENT ORGANIZATION

The Hospitality Student Association (HSA) is open to all majors and minors in the program. They meet monthly, bring in industry speakers, tour local operations, plan and undertake study trips, and plan and produce the Food and Wine Show each spring. HSA awards two \$500 scholarships each year to deserving members.

Financial Aid and Scholarships

The Office of Financial Aid and Scholarships makes available grants, loans, scholarships and work-study employment. Scholarships are also available through the Department of Apparel, Design, and Hospitality Management. Additionally, several hospitality associations have funds for scholarships, which are awarded by the associations through regional and national competition. Contact the Office of Financial Aid and Scholarships, One Stop or the Department of Apparel, Design, and Hospitality Management for additional information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ADHM 140		3 ACCT 102 (Business Minor)	3
CSCI 114 or TL 116 (Gen Ed Science & Tech)		3 ADHM 141	3
ENGL 110 (Gen Ed Communication)		3 ENGL 120 (Gen Ed Communication)	3
Gen Ed Social/Behavioral Science		3 Gen Ed Humanities/Fine Arts	3
Gen Ed Wellness		2 Gen Ed Quantitative Reasoning	3
	14		15
Sophomore			
Fall	Credits	Spring	Credits
ADHM 241		3 ADHM 360	3
ADHM 301		3 HTM Elective	3
COMM 110 (Gen Ed Communication)		3 ECON 105 (Business Minor)	3
Gen Ed Humanities/Fine Arts & Cultural Diversity		3 Gen Ed Science & Tech w/ lab	4
Gen Ed Science & Tech		3 Gen Ed Social/Behavioral	3
	15		16

Junior					
Fall	Credits	Spring	Credits	Summer	Credits
MGMT 320 (Business Minor)		3 ADHM 381		3 ADHM 496	3
MRKT 320 (Business Minor)		3 ADHM 435		3	
ENGL 320 (Gen Ed Communication)		3 HTM Elective		3	
HTM Elective		3 Business Minor Elective		3	
HTM Elective		3 Business Minor Elective		3	
		15			15
Senior					
Fall	Credits	Spring	Credits		
ADHM 404		3 ADHM 479		3	
ADHM 404L		2 HTM Elective		3	
ADHM 467		3 Business Minor Elective		3	
Business Minor Elective		3 Elective		3	
Elective		4			
		15			12

Total Credits: 120

Hospitality and Tourism Management

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/hospitality_and_tourism_management/ (http://www.ndsu.edu/adhm/hospitality_and_tourism_management/)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/hospitality-tourism-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/hospitality-tourism-management/#planofstudytext>)

Major Requirements

Major: Hospitality & Tourism Management

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Hospitality & Tourism Management Requirements		
ADHM 140	Introduction to the Hospitality Industry	3
ADHM 141	Tourism and International Travel Management	3
ADHM 241	Hospitality Accounting	3
ADHM 301	Foundation of Event Management	3
ADHM 360	Lodging Operations Management	3
ADHM 381	Hospitality Marketing and Sales	3
ADHM 404 & 404L	Restaurant Operations Management and Restaurant Operations Management Laboratory	5
ADHM 435	Cost Controls in Hospitality and Food Service Systems	3
ADHM 467	Hospitality Law	3
ADHM 479	Hospitality Industry Management Strategies	3
ADHM 496	Field Experience	3
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
Professional Elective Courses: Select 15 credits from the following:		15
ADHM 372	Global Retailing	
ADHM 379	Study Tour Abroad (with program permission if not taught by HTM)	
ADHM 384	Beverage Operations	
ADHM 391	Seminar (with program permission if not taught by HTM)	
ADHM 401	Event Planning and Production	
ADHM 403	Resort Development and Management	
ADHM 405	Casino Operations	
ADHM 406	Professional Club Management	
ADHM 411	Food and World Cultures (May satisfy general education category A and D)	
ADHM 425	Experiential Retailing	

ADHM 489	Study Tour (with program permission if not taught by HTM)
ADHM 491	Seminar (with program permission if not taught by HTM)
EMGT 461	Business Continuity and Crisis Management
UNIV 397	Fe/Coop Ed/Internship (with program permission)

Business Administration Minor*	24
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Requires a minimum 2.5 GPA in courses used for the minor.

Total Credits	80
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- * The Business Administration minor requirement may be waived for **transfer students** who meet the following criteria:
- Have an earned Associate in Applied Science (AAS) in Business Administration or closely related field¹ from a regionally accredited institution of higher learning. Official transcript must be on file in the Office of Registration and Records;
 - This AAS curriculum must have at least 24 credits of business-related coursework;
 - Earn the AAS degree with a cumulative GPA of at least 2.5;
 - Students must complete necessary General Education requirements not yet addressed by transfer credits; and
 - Students must complete the University's minimum requirement of 36 upper-level credits to complete the degree.
 - *Related fields may include: AAS Business Management; AAS Management; AAS Advertising; AAS Marketing; AAS Business, Marketing, and Sales; AAS Entrepreneurship; AAS Marketing, Sales, and Hospitality Services*

Degree Requirements and Notes

- Electives may be taken to ensure student meets the 120 credit requirement for completion.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits with the exception of UNIV 397.

Minor Requirements

Minor: Hospitality & Tourism Management

Required Credits: 18

Code	Title	Credits
Required Courses		
ADHM 140	Introduction to the Hospitality Industry	3
ADHM 141	Tourism and International Travel Management	3
Elective Courses: Select 12 credits from the following:		12
ADHM 241	Hospitality Accounting	
ADHM 301	Foundation of Event Management	
ADHM 360	Lodging Operations Management	
ADHM 379	Study Tour Abroad (with program permission if not taught by HTM)	
ADHM 381	Hospitality Marketing and Sales	
ADHM 384	Beverage Operations	
ADHM 391	Seminar (with program permission if not taught by HTM)	
ADHM 401	Event Planning and Production	
ADHM 403	Resort Development and Management	
ADHM 404 & 404L	Restaurant Operations Management and Restaurant Operations Management Laboratory	
ADHM 405	Casino Operations	
ADHM 406	Professional Club Management	
ADHM 411	Food and World Cultures	
ADHM 435	Cost Controls in Hospitality and Food Service Systems	
ADHM 467	Hospitality Law	
ADHM 489	Study Tour (with program permission if not taught by HTM)	
ADHM 491	Seminar (with program permission if not taught by HTM)	
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must satisfy all minor course prerequisites.

Human Development and Family Science

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/human-development-family-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/human-development-family-science/>)

Major Requirements

Major: Human Development & Family Science

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

- * May be satisfied by completing courses in another General Education category.
- † General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Human Development & Family Science Core Requirements		
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS 230	Life Span Development (May satisfy general education category B)	3
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life (May satisfy general education category B and D)	3
HDFS 353	Children, Families and Public Policy	3
HDFS 389	Pre-Field Experience	2
HDFS 390	Career Development	1
HDFS 496	Field Experience ¹	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
SOC 110	Introduction to Sociology (May satisfy general education category B)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Option Selection: Select one option from the three listed below.		21
Minor Plan of Study: A minor plan of study is required outside of the HDFS department for all options.		
Total Credits		57

Adult Development and Aging Option

Code	Title	Credits
HDFS 357	Personal and Family Finance	3
HDFS 360	Adult Development and Aging	3
HDFS 480	Community Resources of Later Life	3
HDFS 482	Family Dynamics of Aging	3
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9

Child and Adolescent Development Option

Code	Title	Credits
HDFS 320	Prenatal, Infant and Toddler Development	3
HDFS 330	Child Development	3
HDFS 340	Adolescent Development	3
Select one of the following:		3
HDFS 424	Observation and Assessment of Children	
HDFS 483	Best Practices, Play and Activities from Birth through Adolescence	
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9

Family Science Option

Code	Title	Credits
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 448	Issues In Sexuality	3
HDFS 462	Methods of Family Life Education	3
HDFS 300-400 Level	Major Electives (can include up to 3 credits of HDFS 496 or HDFS 491)	9

¹ In the semester prior to taking field experience credits, students are required to take HDFS 389 Pre-Field Experience. Note: HDFS 491 Senior Thesis may be completed as elective.

Degree Requirements and Notes

- A grade of C or better is required for all HDFS courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits.

Accelerated Program in HDFS

- A combined/accelerated program will allow high-achieving students to complete both a bachelor's and master's degree in HDFS in five years.
- Only students with a cumulative undergraduate GPA of at least 3.50 and who have completed at least 60 credits are eligible to apply. Interested students should speak with an HDFS advisor about how to proceed.
- 15 credits at the master's level may be used to meet the requirements for a bachelor's degree.
- The programs will map as follows:
 - BS-HDFS program with an option in Adult Development and Aging may enter the master's option Gerontology.
 - BS-HDFS program with an option in Child and Adolescent Development may enter the master's option in Youth Development.
 - BS-HDFS program with an option in Family Science may enter the master's option in Family Financial Planning

Minor Requirements

Minor: Human Development & Family Science

Required Credits: 18

Code	Title	Credits
Required Courses		
HDFS 230	Life Span Development	3
HDFS 242	Couples, Marriages and Families	3
Elective Courses ^{1,2}		
HDFS	Any Level Elective	12
Total Credits		18

¹ No more than 3 credits may be a field experience, practicum, or student teaching.

² Note that HDFS 250 or an approved equivalent in another department is a required co-requisite or pre-requisite for all 300-400 level HDFS courses. HDFS 250 may be counted as an HDFS elective course for the minor.

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Human Development and Family Science

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall 283
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)

- **Credential Offered:**

B.A.; B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/human-development-family-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/human-development-family-science/>)

Human development and family science (HDFS) provides a program of study for students interested in a variety of careers that involve work with children, adults and/or families. Students majoring in HDFS may obtain a bachelor's degree.

Career Interest Areas

Career interest areas available at the undergraduate level include:

- Adolescent Development
- Adult Development and Aging
- Child Development
- Cooperative Extension Service
- Family and Human Services
- Family Economics
- Family Life Education
- Financial and Consumer Literacy
- Health Services
- Hospital Child Life
- Parenting and Family Life
- Gerontology

The Program

The major emphasis in HDFS programs is family and human development over the life span. Students gain an understanding of the development of children and adults and their interaction in the family within society.

Students majoring in HDFS have three options: adult development and aging; child and adolescent development; and family science. Each of these options can be completed by itself or can be paired with another degree in one of our dual degree programs. Child development can be paired with elementary education, and family science and adult development and aging can be paired with social work. Information on these dual degree programs is on a separate fact sheet. Each of these options can also be combined with a master's degree program in one of our combined/accelerated master's programs. Child and adolescent development can be combined with the master's program in youth development; family science can be combined with the master's program in family financial planning; and adult development and aging can be combined with the master's program in gerontology. Information on these combined/accelerated degree programs is on a separate sheet.

Courses in the program include:

- Adolescent Development
- Adult Development and Aging
- Child Development
- Diversity and Multiculturalism in Individual and Family Life
- Children, Families, and Public Policy
- Personal and Family Finance
- Issues in Human Sexuality
- Life Span Human Development
- Parent-Child Relations
- Family Dynamics of Aging
- Couples, Marriages, and Families

Students majoring in HDFS enroll for credit in field experience as a critical part of their program of study. The department offers opportunities to work with children, youth, adolescents, older adults and families in various settings.

Career Opportunities

Career directions through HDFS can be divided into two general areas:

Direct Service to Children, Adults and Families – community service worker, outreach worker, parent educator, gerontology outreach, extension agent, or financial counselor to name a few.

Support Service to Children, Adults and Families – program director for nursing or retirement facility, child care director, community and human service worker, consultant in human development, hospital-related services, researcher, child advocate, and family life education are some examples.

Some of the listed careers require a planned minor or a double major. Other careers require preparations beyond the bachelor's degree level. An HDFS degree is excellent preparation for students considering graduate work in counseling, family therapy, child and human development, or as a child life specialist. Study in HDFS provides course work for students interested in careers involving human relations.

Graduates from HDFS are currently employed in a variety of careers. These include extension agent, Head Start program director, child care director, home visitor for Head Start, crisis family counselor, hospital child life specialist, family life educator, developmental disabilities worker, volunteer coordinator, parent support specialist, parent educator, financial counselor and financial planner.

The Facilities

Facilities for the Department of Human Development and Family Science are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center. Included in these buildings are classrooms, conference rooms, research labs, and a child development center serving young children and their families.

Community Setting

The Fargo-Moorhead metropolitan area offers a conducive setting for study. Students have the opportunity to work in a number of community institutions serving children and families. Professionals working with the elderly, child care programs, mental health centers, chemical dependency treatment centers, medical facilities and welfare agencies visit classes and conduct tours to explain their programs for children and families.

Extra-Curricular Opportunities

Students may enhance their involvement in the HDFS area by participating in groups such as the HDFS Club, the North Dakota Association for the Education of Young Children, and the North Dakota Family and Consumer Sciences Association.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Human Development and Family Science

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 SOC 110	3
HDFS 230		3 COMM 110	3
HDFS 242		3 ENGL 120	3
PSYC 111		3 Global Perspective Gen Ed	3
MATH 104		3 Humanities & Fine Arts Gen Ed	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
CSCI 114 or TL 116		3 Humanities & Fine Arts Gen Ed	3
Science & Tech Gen Ed w/ Lab		4 Science & Tech Gen Ed	3
HDFS 250		3 STAT 330	3
Elective		4 HDFS 275	3
		Elective	3
		14	15
Junior			
Fall	Credits	Spring	Credits
HDFS Option Course *		3 HDFS 389	2
HDFS 300-400 level elective		3 HDFS 390 Career Development	1
ENGL 320, 325, 358, or 459		3 HDFS Option Course *	3

Elective for Minor	3	HDFS 300-400 level elective	3
Elective	4	Elective for Minor	3
		Elective	3
	16		15
Senior			
Fall	Credits	Spring	Credits
HDFS 496		3 HDFS Option Course *	3
HDFS 353		3 HDFS 300-400 level elective	3
HDFS Option Course *		3 Elective for Minor	3
Elective for Minor		3 Elective for Minor	3
Elective for Minor		3 Elective	3
	15		15
Total Credits: 120			

*HDFS Option Courses: Adult Development and Aging (HDFS 360, 357, 480, and 482)
 Child and Adolescent Development (HDFS 320, 330, 340, and Either 424 or 483)
 Family Science (HDFS 341, 357, 448, and 462)

Sample Program Guide

HDFS Accelerated Master's Option in Gerontology

Undergraduate students in the Adult Development and Aging option can earn a Master's degree in HDFS in the Gerontology option by completing just one additional year of classes. 15 credits of the undergraduate curriculum are replaced by 15 graduate credits.

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 SOC 110	3
HDFS 230		3 COMM 110	3
HDFS 242		3 ENGL 120	3
PSYC 111		3 Global Perspectives Gen Ed	3
MATH 104		3 Humanities & Fine Arts Gen Ed	3
	15		15
Sophomore			
Fall	Credits	Spring	Credits
CSCI 114 or TL 116		3 Humanities & Fine Arts Gen Ed	3
Science & Tech Gen Ed w/ Lab		4 Science & Tech Gen Ed	3
HDFS 250		3 HDFS 275	3
Elective		4 STAT 330	3
		Elective	3
	14		15
Junior			
Fall	Credits	Spring	Credits
HDFS 360		3 HDFS 389	2

ENGL 320, 325, 358, or 459	3	HDFS 390 Career Development	1		
HDFS 357	3	HDFS 480	3		
Elective for Minor	3	Elective for Minor	3		
Elective for Minor	3	Elective for Minor	3		
		Elective	3		
	15		15		
Senior					
Fall	Credits	Spring	Credits		
HDFS 353	3	HDFS 721	3		
HDFS 496	3	HDFS 682	3		
HDFS 723	3	HDFS 7XX Elective	3		
Elective for Minor	3	Elective for Minor	3		
Elective	3				
	15		12		
Fifth Year					
Fall	Credits	Spring	Credits	Summer	Credits
HNES 652	3	HDFS 794	4	HDFS 729	3
HDFS 760	3	HDFS 722	3		
HDFS 794	2	ADHM 705	3		
HDFS 7XX Elective	3				
	11		10		3

Total Credits: 140

Degree Notes:

- How to Apply to the Program (<https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf>)
- More Information About the Gerontology Master's Option (<https://bulletin.ndsu.edu/programs-study/graduate/human-development-family-science/>)

Sample Program Guide

HDFS Accelerated Master's Option in Family Financial Planning

Undergraduate students in the Family Science option can earn a Master's degree in HDFS in the Family Financial Planning option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits.

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
ENGL 110	3	SOC 110	3		
HDFS 230	3	COMM 110	3		
HDFS 242	3	ENGL 120	3		
PSYC 111	3	Humanities & Fine Arts Gen Ed	3		
MATH 104	3	Global Perspectives Gen Ed	3		
	15		15		

Sophomore					
Fall	Credits	Spring	Credits		
CSCI 114 or TL 116		3 Humanities & Fine Arts Gen Ed	3		
Science & Tech Gen Ed w/ Lab		4 HDFS 275	3		
HDFS 250		3 Science & Tech Gen Ed	3		
Elective		4 STAT 330	3		
		Elective	3		
14			15		
Junior					
Fall	Credits	Spring	Credits		
HDFS 357		3 HDFS 389	2		
ENGL 320, 325, 358, or 459		3 HDFS 390 Career Development	1		
Elective for Minor		3 HDFS 341	3		
Elective for Minor		3 Elective for Minor	3		
Elective for Minor		3 Elective for Minor	3		
		Elective	3		
15			15		
Senior					
Fall	Credits	Spring	Credits	Summer	Credits
HDFS 353		3 HDFS 462	3	HDFS 763	3
HDFS 770		3 HDFS 677	3	HDFS 771	3
HDFS 496		3 HDFS 740	3		
Elective for Minor		3 HDFS 765	3		
Elective		3			
15			12	6	
Fifth Year					
Fall	Credits	Spring	Credits		
HDFS 762		3 HDFS 769	3		
HDFS 766		3 HDFS FFP Elective	3		
HDFS FFP Elective		3 HDFS FFP Elective	3		
9			9		

Total Credits: 140

Degree Notes:

- How to Apply to the Program (<https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf>)
- More Information About the Family Financial Planning Master's Option (<https://bulletin.ndsu.edu/programs-study/graduate/human-development-family-science/>)

Sample Program Guide

HDFS Accelerated Master's Option in Youth Development

Undergraduate students in the Child and Adolescent Development option can earn a Master's degree in HDFS in the Youth Development option by completing just one additional year of classes. Fifteen credits of the undergraduate curriculum are replaced by 15 graduate credits.

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
ENGL 110		3 SOC 110	3		
HDFS 230		3 COMM 110	3		
HDFS 242		3 ENGL 120	3		
PSYC 111		3 Global Perspectives Gen Ed	3		
MATH 104		3 Humanities & Fine Arts Gen Ed	3		
		15	15		
Sophomore					
Fall	Credits	Spring	Credits		
CSCI 114 or TL 116		3 Humanities & Fine Arts Gen Ed	3		
Science & Tech Gen Ed w/ Lab		4 HDFS 275	3		
HDFS 250		3 Science & Tech Gen Ed	3		
Elective		4 STAT 330	3		
		Elective	3		
		14	15		
Junior					
Fall	Credits	Spring	Credits		
HDFS 340		3 HDFS 389	2		
ENGL 320, 325, 358, or 459		3 HDFS 390 Career Development	1		
Elective for Minor		3 HDFS 330	3		
Elective for Minor		3 Elective for Minor	3		
Elective		3 Elective for Minor	3		
		Elective	3		
		15	15		
Senior					
Fall	Credits	Spring	Credits	Summer	Credits
HDFS 353		3 HDFS 483	3	HDFS 714	3
HDFS 496		3 HDFS 711	3	HDFS 7XX Elective	3
HDFS 710		1 HDFS 712	3		
HDFS 713		3 HDFS 716	3		
Elective for Minor		3			
Elective for Minor		3			
		16	12		6
Fifth Year					
Fall	Credits	Spring	Credits		
HDFS 715		3 HDFS 717	3		
HDFS 718		3 HDFS 794	5		

HDFS 719

3

9

8

Total Credits: 140**Degree Notes:**

- How to Apply to the Program (<https://www.ndsu.edu/fileadmin/facultysenate/acadaffairs/accelerated-programs.pdf>)
- More Information About the Youth Development Master's Option (<https://bulletin.ndsu.edu/programs-study/graduate/human-development-family-science/>)

Industrial Engineering and Management

Department Information

- **Department Location:**
Civil & Industrial Engineering 202
- **Department Phone:**
701-231-9818
- **Department Web Site:**
www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)
- **Credential Offered:**
B.S.I.E.Mgt.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/industrial-engineering-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/industrial-engineering-management/>)

World leadership—whether for nations, states or individual companies—depends upon providing the highest quality in goods and services at costs that are affordable to the widest possible audience. Retaining world-class status requires relentless and continuous improvement in all aspects of the business or governmental enterprise. Industrial engineers use a systems approach and focus on the processes for achieving quality, continuous improvement and cost effectiveness for all types of enterprises—manufacturers, healthcare service industries, non-profits and governments.

The Profession

Industrial engineers are involved in the creation of wealth and prosperity. This is achieved through designing and implementing better, more productive systems in both a manufacturing and a service environment. Industrial engineering is an interdisciplinary program by nature. Industrial engineers design, install, fabricate and integrate systems that include people, materials, information, equipment and energy necessary to accomplish the desired function. Industrial engineers are hired in every industry type such as manufacturing, healthcare, hotel, banking and finance, food processing, chemical and oil industry, distribution and logistics, and more.

Industrial engineers often are responsible for productivity improvements, supply chain optimization, project management, feasibility studies for new technologies and applications, lean and just-in-time implementation, health care management and logistics, and systems integration and engineering. Whether it's shortening a rollercoaster wait line, streamlining an operating room, managing a worldwide supply chain, manufacturing and designing superior automobiles, or solving logistics problems, industrial engineers are at the forefront.

The Program

The Department of Industrial and Manufacturing Engineering (IME) at North Dakota State University offers two programs leading to either a Bachelor of Science degree in Industrial Engineering and Management or in Manufacturing Engineering. Both programs are accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

As a graduate of industrial engineering, you will have the opportunity to design systems and processes that improve the quality and productivity of an organization's business activities. You will employ a strong base of fundamental engineering and management skills to effectively integrate people and resources to create positive change. Quite simply, you will design and implement the best way to get work done.

The Faculty and Facilities

The faculty and staff in the IME department have extensive experience in industrial and manufacturing specialties. The IME faculty and staff will know your name, understand your potential and problems, and will give encouragement when you need it. When you leave NDSU, you will have built excellent capabilities for career success, the confident ability for life-long personal growth, and a network of friends and professional colleagues.

The IME department has 7 laboratories with a significant amount of equipment that provide valuable services in support of students' educational needs. The departmental laboratories include computer simulation, human factors, automation and robotics, additive manufacturing engineering,

quality & reliability, SPACHES, PLC, manufacturing/fabrication, rapid prototyping, CNC machining, and microfabrication, as well as electronics, welding and precision manufacturing.

Career Opportunities

The IME programs can help you to open the door to various opportunities starting your professional career in a wide range of industries or to seek advanced degrees at NDSU or another university. The IME programs will help you to develop a strong base in general education and engineering fundamentals that provide the foundation for a very wide range of career choices and a lifetime of growth. The IME programs' core will help you develop industry-standard skills—the skills you can use to open the door to many career opportunities that can offer you financial rewards and exceptional professional growth.

Graduates of the IME programs have become a source of talent working in industries such as health care, manufacturing, consulting, food, transportation and distribution, and information systems. Recent IME graduates command starting salaries in the top rank of engineering disciplines. According to the Bureau of Labor Statistics, the national average salary was \$87,040 in 2019 (<https://www.bls.gov/ooh/architecture-and-engineering/industrial-engineers.htm>).

Transfer Admission

Students who have studied two years of pre-engineering at another institution may be able to transition into the industrial engineering and management program with no loss of credits. Students who transfer with an AA or AS degree will have lower division general ed credits satisfied.

Scholarship and Financial Aid

The Department of Industrial and Manufacturing Engineering awards several scholarships annually. Scholarships are available for incoming freshman, transfer students and currently enrolled students. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

Selective Admission

The Department of Industrial and Manufacturing Engineering has minimum admission requirements for transfer students. Transfer students must have a minimum cumulative grade point average of 2.3.

Industrial Engineering and Management Minor

Students majoring in any engineering discipline may elect a minor in Industrial Engineering and Management. These optional studies offer engineering students the opportunity to add important career-enhancing skills to their technological competencies. The elected courses in an IE&M minor add skills for integrating technology and resources within the complex of people, technology, machinery and information that make up the successful modern business enterprise. Students completing this minor will achieve better understanding of organizational and management processes and will be better prepared to work in the multi-functional teams crucial to success in industry. Total requirement is 18 credits (6 credits are required courses and 12 credits of approved electives), 9 of which must be unique and not count towards the major.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CHEM 121 & 121L		4 IME 111	3
ENGL 110		3 MATH 166	4
ENGL 120		3 ME 212	3
MATH 165		4 ME 221	3
COMP SCI ELECTIVE (Select from approved list of computer science electives)		3 CHEM 122	3
		17	16
Sophomore			
Fall	Credits	Spring	Credits
COMM 110		3 IME 311	3
IME 330		3 ME 223	3
MATH 129		3 MATH 266	3

MATH 259	3	PHYS 252 & 252L	5
ME 222	3	GEN ED Social & Behavioral Sci and Cultural Diversity	3
GEN ED Humanities/Fine Arts and Global Perspectives	3		
18		17	
Junior			
Fall	Credits	Spring	Credits
IME 456	3	IME 461	3
IME 460	3	IME 470	3
ENGL 321	3	IME 472	3
CE 309	3	ME 350	3
IME 440	3	GEN ED Social & Behaioral Sci and Cultural Diversity	3
		GEN ED Wellness	2
15		17	
Senior			
Fall	Credits	Spring	Credits
ENGR 402	1	IME 450	3
IME 480	3	IME 489	3
IME 482	3	ENGR SCI ELECTIVE (Select from approved list of electives)	3
IME 485	3	TECHNICAL ELECTIVE (Select from approved list of electives)	3
GEN ED Humanities/Fine Arts and Global Perspectives	3	TECHNICAL ELECTIVE (Select from approved list of electives)	3
TECHNICAL ELECTIVE (Select from approved list of tech electives)	3		
16		15	

Total Credits: 131

Industrial Engineering and Management

Department Information

- **Department Location:**
Civil & Industrial Engineering
- **Department Phone:**
701-231-9818
- **Department Web Site:**
www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)
- **Credential Offered:**
B.S.I.E.Mgt.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/industrial-engineering-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/industrial-engineering-management/#planofstudytext>)

Major Requirements

Major: Industrial Engineering & Management

Degree Type: B.S.I.E.Mgt.

Minimum Degree Credits to Graduate: 132**University Degree Requirements**

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Industrial Engineering & Management Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 440	Engineering Economy	3
IME 450	Systems Engineering and Management	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 470	Operations Research I	3
IME 472	Simulation of Business and Industrial Systems	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3
IME 489	Industrial and Manufacturing Engineering Capstone	3

MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5

Industrial Engineering and Management Electives

Computer Science Electives: Select one of the following: 3

CSCI 122	Visual BASIC
CSCI 159	Computer Science Problem Solving
CSCI 160	Computer Science I
ECE 173	Introduction to Computing

Programming Language: Any programming language course must be approved by your adviser.

Engineering Science Electives: Select 12 credits from the following:

CE 309	Fluid Mechanics	3
ME 223	Mechanics of Materials	3
ME 350	Thermodynamics and Heat Transfer	3

Select one of the following: 3-4

EE 206	Circuit Analysis I
ECE 275	Digital Design
ECE 301	Electrical Engineering I

Technical Electives: Select 9 credits from the following: 9

IME 335	Welding Technology
IME 380	CAD/CAM for Manufacturing
IME 411	Human Factors Engineering
IME 427	Packaging for Electronics
IME 430	Process Engineering
IME 431	Production Engineering
IME 432	Composite Materials Manufacturing
IME 437	Methods for Precision Manufacturing
IME 433	Additive Manufacturing
IME 435	Plastics and Polymer Processing in Manufacturing
IME 451	Logistics Engineering and Management
IME 453	Hospital Management Engineering
IME 462	Total Quality In Industrial Management
IME 463	Reliability Engineering
IME 464	Reliability Analysis
IME 465	Introduction to Machine Learning

Only one of the following 5 courses may be counted as a technical elective.

BUSN 340	International Business
BUSN 431	Business Law I-Contracts, Property and Torts
MGMT 320	Foundations of Management
MRKT 320	Foundations of Marketing

MIS 320	Management Information Systems
Total Credits	108-109

Degree Requirements and Notes

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Minor Requirements

Minor: Industrial Engineering & Management

Required Credits: 18

Code	Title	Credits
Required Courses		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
Electives: Select 12 credits from the following:		12
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 453	Hospital Management Engineering	
IME 456	Program and Project Management	
IME 461	Quality Assurance and Control	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 465	Introduction to Machine Learning	
IME 470	Operations Research I	
IME 472	Simulation of Business and Industrial Systems	
IME 480	Production and Inventory Control	
IME 482	Automated Manufacturing Systems	
IME 485	Industrial and Manufacturing Facility Design	
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- 9 of the 18 credits for this minor must be unique and cannot count toward requirements in the student's engineering major.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Industrial Engineering & Management.

Interior Design

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall 178
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/interior_design/ (http://www.ndsu.edu/adhm/interior_design/)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/interior-design/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/interior-design/>)

A professional interior designer is one who is qualified by education, examination, and experience to identify, research and creatively solve problems relative to the function and quality of people's interior environments. The course of study in interior design leads to a first professional degree.

Background Information

The program focuses on improving the quality of life and protecting human health and safety through design of the interior environment. Students study design fundamentals, theory, process, communication, research, and technology to identify and solve problems for a wide range of physical interior environments for all individuals.

The Program

The Department of Apparel, Design, and Hospitality Management offers an accredited undergraduate degree program in interior design. The first two years of the program introduce the fundamentals of design, visual and technical communication techniques (including drafting, perspective drawing, model building, rendering, computer aided design), and theoretical and practical applications (including anthropometrics, ergonomics, inclusive design, interior design technology and color theory). Each student becomes aware that the interior design profession is exceedingly complex, and collaborating with design professionals and related disciplines in a team approach to problem solving is routine practice.

Beginning their first year through their final semester, students interact with professionals during industry tours, critiques, and guest speaking events providing a direct connection to the interior design profession. Upper-division course work is focused on a series of integrated studio experiences and supporting courses including history, evidence based design, interior materials, professional practice, building information modeling and interior systems. The studio experience culminates in a senior capstone project. Studio experiences require that each student be exposed to a variety of projects at several different levels of complexity and different client project goals.

Field Experience

North Dakota State University interior design students are required to complete a field experience between the third and fourth year of the program. Students accept a variety of positions throughout the United States and abroad. Students have completed field experiences in places such as Los Angeles, Minneapolis, Denver, Florida, New York, Ireland, and Shanghai (China).

Selective Admission

Admission into the second year professional program comes at the conclusion of the first year of the pre-professional program and is based upon demonstrated professional interest and involvement; a 3.0 institutional cumulative GPA, and a minimum grade of C in all major core requirements. Students must maintain the 3.0 minimum cumulative GPA requirement and a grade of C or better in all major core requirements throughout the remainder of the program.

COMPUTER REQUIREMENTS

All students are required to purchase a laptop computer prior to starting the program. Students **must be in compliance** with the computer requirements posted on the program web site. Computers failing to be in compliance will not be supported.

Accreditation

The interior design program at NDSU is accredited by the Council for Interior Design Accreditation (CIDA) and received re-accreditation in 2016. The program is also accredited by the National Association of Schools of Art and Design (NSAD).

Career Opportunities

Three main career paths typically chosen by the design professional include residential, commercial and specialized design. Residential design includes kitchen and bath design, renovation for physically challenged, model homes or historical restoration. Commercial design includes corporate and executive offices, healthcare, retail facilities, institutional transportation, and hospitality and entertainment venues. Other areas of specialty design include lighting, codes, adaptive reuse, product design or product representation.

Opportunities for NDSU graduates vary according to the geographic area of practice and the responsibilities of specific positions. Recent graduates have accepted entry-level positions with starting salaries as high as \$50,000 (Minneapolis).

Extra-Curricular Opportunities

NDSU students participate locally in the student chapter of the American Society of Interior Designers (ASID). Students also have the opportunity to participate in the North Dakota Interior Designers (NDID) organization. A number of professionals visit campus each year to present programs and informational seminars to students. Trips are planned to design studios, architectural firms and product markets to supplement course work. NDSU interior design students are encouraged to enter design competitions and have experienced a very high success rate.

The Facilities

NDSU facilities and instructional amenities are among the finest in the Upper-Midwest. The Interior Design Resource Center is well equipped with current samples and a virtual product library. Studios provide individual workstations and tools necessary to complete successful design solutions.

The Faculty

NDSU faculty hold terminal degrees in interior design or related fields and have been selected because of their individual and collective experience as interior designers and their commitment to teaching. All hold memberships in professional design-related organizations.

Introductory Curriculum

A suggested curriculum is provided. Other general education combinations are possible, but the eight sequential semesters beginning with the fall term of interior design courses cannot vary from this plan. Students who plan to transfer to NDSU should contact the Interior Design Program Coordinator for guidance in selecting courses before or during the first-year sequence.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
ADHM 151		3 ADHM 261	3		
ADHM 152		1 ADHM 365	3		
ADHM 160		1 COMM 110	3		
ADHM 161		3 ENGL 120	3		
ENGL 110		3 Gen Ed Quantitative Reasoning	3		
Gen Ed Social & Behavioral Sciences		3 Gen Ed Wellness	2		
		14	17		
Sophomore					
Fall	Credits	Spring	Credits		
ADHM 251		3 ADHM 253	3		
ADHM 264		2 ADHM 363	3		
CSCI 114 or TL 116		3 ADHM 368	4		
ART 111, 210, or 211		3 ADHM 491	1		
Gen Ed Science & Technology with Lab		4 Minor Course	3		
		Gen Ed Science & Technology with Lab	3		
		15	17		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 315		3 ADHM 316	3	ADHM 496	3
ADHM 351		3 ADHM 353	3		
ADHM 460		3 Gen Ed Social & Behavioral Sciences	3		
ADHM 461		3 Minor Course	3		
ADHM 366 & ADHM 367		4 Minor Course	3		
		16	15		3

Senior			
Fall	Credits	Spring	Credits
ADHM 450		3 ADHM 452	6
ADHM 491		1 Minor Course	3
Gen Ed Upper Division Writing		3 Minor Course	3
Minor Course		3 Minor Course as needed	3
Minor Course as needed		3	
		13	15

Total Credits: 125

- * **Minor Options:** One of the following minors is required: Art; Business; Hospitality and Tourism Management; Apparel, Retail Merchandising and Design; Foreign Language (French, German, Spanish); Communication; History; Gerontology; Emergency Management; Natural Resource Management; other minor options may be approved by interior design faculty. (Total Credits required to complete minors will vary).

Interior Design

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8604
- **Department Web Site:**
www.ndsu.edu/adhm/interior_design/ (http://www.ndsu.edu/adhm/interior_design/)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
<https://bulletin.ndsu.edu/programs-study/undergraduate/interior-design/#planofstudytext>

Major Requirements

Major: Interior Design

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	

Upper Division Writing [†]	
Quantitative Reasoning (R) [†]	3
Science and Technology (S) [†]	10
Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Students must maintain a 3.00 cumulative GPA and a minimum grade of 'C' in all major core requirements.

Code	Title	Credits
Interior Design Core Requirements		
ADHM 151	Design Fundamentals	3
ADHM 160	Interior Design Careers	1
ADHM 161	Introduction to Manual Drafting	3
ADHM 152	Visual Communication I	1
ADHM 261	Visual Communications II	3
ADHM 251	Interior Design Studio I-Residential	3
ADHM 253	Interior Design Studio II-Small Scale Contract	3
ADHM 264	Residential Systems	2
ADHM 315	History of Interiors I (May satisfy general education category A)	3
ADHM 316	History of Interiors II (May satisfy general education category A)	3
ADHM 351	Interior Design Studio III-Advanced Residential	3
ADHM 353	Interior Design Studio IV-Large Scale Contract Design	3
ADHM 363	Commercial Lighting Design and Building Systems	3
ADHM 365	CADD for Interiors	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 368	Interior Materials	4
ADHM 450	Research and Project Development in Interior Design	3
ADHM 452	Comprehensive Interior Design Project	6
ADHM 460	Career Development and Professional Practice	3
ADHM 461	Building Information Modeling	3
ADHM 491	Seminar	2-3
ADHM 496	Field Experience	3
CSCI 114	Computer Applications (May satisfy general education category S)	3
or TL 116	Business Software Applications	
Department Requirement: Select one of the following:		3
ART 111	Introduction to Art History	
ART 210	Art History I	
ART 211	Art History II	
Minor Program of Study Required		16

One of the following minors is required: Art; Business; Hospitality and Tourism Management; Apparel, Retail Merchandising and Design; Foreign Language (French, German, Spanish); History; Gerontology; Emergency Management; Natural Resource Management; other minor options may be approved by interior design faculty. (Total credits required to complete minors will vary).

Total Credits

87-88

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Minor Requirements

Minor: Interior Design

Required Credits: 23

Code	Title	Credits
ADHM 151	Design Fundamentals	3
ADHM 161	Introduction to Manual Drafting	3
ADHM 251	Interior Design Studio I-Residential	3
ADHM 261	Visual Communications II	3
ADHM 264	Residential Systems	2
ADHM 315	History of Interiors I	3
or ADHM 316	History of Interiors II	
ADHM 365	CADD for Interiors	3
ADHM 368	Interior Materials	3

Total Credits

23

Minor notes:

- To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements.
- Courses may not be taken pass/fail. Students must also earn a grade of 'C' or better in all courses required for the minor.
- Students are subject to the minor requirements in effect during the year in which the minor was declared.
- Students must satisfy all minor course prerequisites.
- Minors must meet program computer requirements.

International Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8845
- **Department Web Site:**
ndsustudyabroad.applicationgateway.com/index.cfm?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616 (http://ndsustudyabroad.applicationgateway.com/?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616)
- **Credential Offered:**
Offered as a second major only
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/international-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/international-studies/>)

Major Requirements

Major: International Studies

Required Credits: 33

Degree Type: Offered as a secondary major only; students must select a primary major before adding International Studies.

Code	Title	Credits
International Studies Core Requirements		
Group A:		
INTL 110	Introduction to International Studies	3
Group B: Select two courses from the following:		6
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World *	
ECON 205	Market Values	
GEOG 161	World Regional Geography	
HIST 355	History of Global Islam	
or RELS 100	World Religions	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Group C: Select one from the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
Group D: Select one from the following:		3
ANTH 111	Introduction to Anthropology	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World *	
SOC 116	Global Social Problems	
Electives: Select 9 credits from the following:		9
Select courses with a significant international focus from the categories listed below. At least 3 credits MUST come from outside the student's primary major of study. Courses used for the International Studies Core cannot also count as electives. Other courses may be approved for this area with the approval of the College International Studies Advisor. A substitution form submitted to the Office of Registration and Records will be required in these instances.		
Agriculture:		
AGEC 220	World Agricultural Development	
AGEC 360	International Agribusiness Experience	
ECON 456	History of Economic Thought	
ECON 461	Economic Development	
ECON 472	International Trade	
NRM 225	Natural Resources & Agrosystems	
PLSC 110	World Food Crops	
Business Administration:		
BUSN 340	International Business	
BUSN 341	Global Business Environment	
BUSN 379	Study Tour Abroad	
BUSN 440	International Business Law	
BUSN 491	Seminar (Challey Speakers Series or other international seminars only.)	
ENTR 440	International Entrepreneurship	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 372	Global Retailing	
MRKT 440	International Marketing	
Architecture:		
ARCH 321	History and Theory of Architecture I	
ARCH 322	History and Theory of Architecture II	
ARCH 323	History and Theory of Architecture III	

ARCH 474	International Design Studio
LA 322	History of Landscape Architecture
Human Development and Education:	
ADHM 315	History of Interiors I
ADHM 316	History of Interiors II
ADHM 372	Global Retailing
ADHM 385	Global Fashion Economics
ADHM 410	Dress in World Cultures
ADHM 411	Food and World Cultures
ADHM 485	Global Consumer Analysis
EDUC 416	Teacher Education in International Comparative Perspective
HDFS 275	Diversity and Multiculturalism in Individual and Family Life
HNES 355	International Health
Humanities and Social Sciences:	
ANTH 111	Introduction to Anthropology
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World
ANTH 443	Peoples and Cultures of the Middle East & North Africa
ANTH 444	Peoples of the Pacific Islands
ANTH 446	Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity
ANTH 453	Magic and Religion
ANTH 455	Language and Expressive Culture
ANTH 459	Global Cultural Heritage
ART 111	Introduction to Art History
ART 210	Art History I
ART 211	Art History II
COMM 216	Intercultural Communication
ENGL 209	Introduction to Linguistics
ENGL 240	World Literature Masterpieces
ENGL 330	Women's Writing
ENGL 335	Multicultural Writers
ENGL 455	International Technical Writing
EMGT 425	World Disasters
HIST 101	Western Civilization I
HIST 102	Western Civilization II
HIST 259	Women in European History 1400-1800
HIST 271	Introduction to Latin American History
HIST 280	History of East Asia to 1600
HIST 281	History of East Asia from 1600
RELS/HIST 355	History of Global Islam
HIST 381	Australia & New Zealand
HIST 435	World Environmental History
HIST 440	The Ottoman Empire
HIST 451	Medieval History
HIST 456	Europe 1815-1914
HIST 457	Europe Since 1914
HIST 464	Imperial Spain
HIST 465	Germany since 1750
HIST 466	History Of Russia I
HIST 467	History Of Russia II
HIST 470	Modern Latin America I
HIST 471	Modern Latin America II
HIST 473	Colonial Mexico

HIST 474	Modern Mexico
HIST 475	The Aztec, Maya, and Inca
HIST 477	Slavery in the Atlantic World
HIST 480	History of Modern China from 1600
HIST 481	History of Japan
HIST 482	Vietnam: 125 Years of Conflict
HIST 485	Cultural Exchange and the Making of the Modern World
FREN 315	Contemporary France
FREN 340	The French-Speaking World
FREN 345	Women in French Literature
FREN 365	Advanced Conversation Through Contemporary Culture
FREN 410	French Literature & Culture before 1800
FREN 412	French Literature & Culture since 1800
FREN 420	Themes & Topics in French Literature & Culture
FREN 422	Genres in French Literature
GERM 220	German Culture & Society
SPAN 330	Introduction to Spanish Civilization
SPAN 331	Introduction to Spanish American Civilization
SPAN 332	Introduction to Hispanic Cinema
SPAN 440	Traditions in Spanish American Literature
SPAN 441	Contemporary Spanish American Literature
SPAN 442	Introduction to Chicano Literature
SPAN 443	Spanish American Women Writers
SPAN 450	Traditions in Spanish Literature
SPAN 451	Contemporary Spanish Literature
SPAN 453	Spanish Women Writers
MUSC 340	Music History I
MUSC 341	Music History II
PHIL 215	Contemporary Moral Issues
PHIL 321	Ancient Philosophy
PHIL 322	Medieval Philosophy
PHIL 323	Modern Philosophy
PHIL 370	Social and Political Philosophy
PHIL 476	History of Philosophy: Modern Period
POLS 120	Terrorism
POLS 220	International Politics
POLS 225	Comparative Politics
POLS 240	Political Ideologies
POLS 442	Global Policy Issues
POLS 444	International Law
POLS 445	Ethnic Conflicts
POLS 446	International Criminal Law
POLS 450	Politics of the Developing Countries
POLS 451	Politics of the Industrialized Countries
POLS 452	Comparative Political Economy
RELS 100	World Religions
SOC 443	International Disasters
THEA 115	World Film
THEA 280	World Theatre
WGS 370	Transnational/Global Women
Science and Mathematics:	
BIOL 124	Environmental Science

BIOL 100L	Non-Majors Biology Lab	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
Any College: 3 credit limit from the following:		
(Prefix) 379	Study Abroad Tour	
(Prefix) 494	Individual Study	
Foreign Language Proficiency Requirement		3-14
Proficiency at the 202-level (Fourth semester) is required. Language proficiency must be satisfied prior to the 10-week abroad experience		
Proposal for Integrative Senior Project		
A written proposal is to be submitted to the Director of the International Studies Major and the student's senior project advisor. The proposal will be graded and must be done PRIOR to project completion.		
INTL 488	Integrated Senior Project Proposal	1
Completion of Study, Work Experience, or Research Abroad Requirement		
Approved, 10-week or equivalent experience spent abroad in an approved program. Must be 10 consecutive weeks.		3-6
Integrative Senior Project Requirement		
INTL 489	Integrative Senior Project	2
Total Credits		33-47

* ANTH 206 may fulfill the Group B **OR** the Group D requirements but not both.

Major Requirements and Notes

- The General Education component is to be completed with the student's choice of primary major.
- Students must maintain a 2.5 Cumulative GPA to continue in the program.
- Courses for the International Studies core may not double count to meet the major requirements of the primary major. However, courses meeting general education requirements and requirements for global perspectives and cultural diversity may count in the International Studies major.
- The electives list is not all inclusive; other courses meeting this requirement may be selected with the assistance of an International Studies major adviser and submission of a substitution form to the Office of Registration and Records (<https://www.ndsu.edu/registrar/>).

International Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8845
- **Department Web Site:**
nds-studyabroad.applicationgateway.com/index.cfm?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616 (http://nds-studyabroad.applicationgateway.com/?FuseAction=Abroad.ViewLink&Parent_ID=0&Link_ID=84ED8C0B-26B9-564D-D6D3F9968C0D3616)
- **Credential Offered:**
Offered as a second major only
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/international-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/international-studies/>)

The International Studies major is a secondary major that is offered concurrently with a student's primary program of study. This program provides students with the opportunity to internationalize their major by combining special requirements to obtain the international studies major with their academic field of study. Students complete course work that integrates a senior project, demonstrate proficiency in a foreign language, and participate in an experience abroad to complete a second major in International Studies.

Courses

In addition to the courses required for the primary major, students seeking the International Studies major are required to take courses that have an international focus. These include a 15-credit core and nine credits of electives that will be chosen with the help of the student's adviser. Work or study abroad experience, as well as an integrative senior project that ties international study to the primary degree also are required.

Languages

Knowledge of a foreign language is an important part of the program. At NDSU students may study French, German, and Spanish. Additional language study is available through the Tri-College University in languages such as Japanese and Chinese. Foreign language proficiency equivalent to completion of two years of college language study is required. This requirement may be met either through appropriate course work or through a testing procedure in the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>).

Experience Abroad

An important part of the International Studies major is participation in a study, work, or research experience abroad for at least 10 consecutive weeks in duration. The experience abroad must be pre-approved by the International Studies adviser. Assistance with finding an overseas study program is available in the Office of International Programs (<https://www.ndsu.edu/international/>).

Selective Admission

To be eligible to participate in the International Studies major, students must have declared a primary major and maintain a minimum cumulative grade-point average of 2.50. Additional information about the International Studies major and curriculum requirements are available through the department of a student's primary academic major, the college International Studies adviser, or the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>).

Journalism

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/journalism/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/journalism/>)

Journalism is one of four majors offered by the Department of Communication. Students are trained in both print and broadcast journalism. The program has a strong emphasis on cross-platform reporting and multi-media storytelling.

Why Choose a Major in the Department of Communication?

Our students pursue degrees in Communication because they are interested in fast-paced careers where every day brings something new. They want to make a difference in the world while doing something they love – whether that's reporting breaking news, designing advertisements, running social media campaigns, promoting organizations, or leading others in the workplace.

As a Journalism major, you will get:

- **More time to explore your interests.** We give you the first year to explore your options, making it possible to switch between **four different COMM majors** without extending your graduation timeline.
- **Guidance on choosing a career.** In COMM 101: Majors and Careers in Communication, you will meet others in your major, learn more about possible careers, and find campus resources that help you achieve your professional goals.
- **Hands-on learning.** You'll have multiple ways to apply what you are learning through course projects, consulting for local organizations, and participating in national competitions.
- **Built-in communities.** You can connect with other students - while building your resume - through the **eight student organizations** affiliated with our department.
- **Professional experience.** We help you find and benefit from internships in your field through our relationships with local and regional employers.

Journalism Major

Students majoring in journalism may earn a Bachelor of Science degree (includes an approved minor) or a Bachelor of Arts degree (includes a modern language proficiency).

Admission to the Major

Students complete 18 credits of Pre-Communication courses with a minimum 3.00 GPA to be admitted to the professional program in journalism. These courses include COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for journalism students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with a variety of media companies in the Fargo-Moorhead area and beyond. Internships often lead to jobs.

Career Opportunities

Coursework in the journalism major prepares students for careers in news reporting, media writing, broadcast writing, and broadcast production. The courses emphasize written and oral communication skills and prepare students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in journalism are encouraged to gain additional experience by working with the Bison Information Network (television), KNDS-96.9 (radio), or The Spectrum (print). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

A well-rounded high school education with experiences in high school music, forensics, theater, newspaper, or yearbook serves as good preparation for a major in journalism. Students with interests in science and art, business and service, and publicity and promotion will find a major in this department to be a good fit.

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit [the department website](#) for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research. We encourage students who want to learn more about journalism to reach out via email or schedule an appointment via [Navigate](#).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 101		1 COMM 110	3
COMM 112		3 COMM 200	3
COMM 114		3 ENGL 120	3
ENGL 110 (or placement)		3 Humanities/Arts GE	3
Quantitative Reasoning GE		3 Science/Technology GE	3
Wellness GE		2 Science/Technology Lab GE	1
		15	16
Second Year			
Fall	Credits	Spring	Credits
COMM 212		3 COMM 320	3
COMM 220		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Global Perspectives GE		3 Humanities/Arts GE	3

Science/Technology GE	3	Science/Technology GE	3
	15		15
Third Year			
Fall	Credits	Spring	Credits
COMM 310		3 Major Elective	3
COMM 496		3 Major Elective	3
Major Elective		3 Minor or Language Coursework	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Upper Division Writing		3 AHSS Requirement	3
	15		15
Fourth Year			
Fall	Credits	Spring	Credits
COMM 431		3 COMM 465	3
Major Elective		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
AHSS Requirement		3 Additional Coursework May Be Required to Reach 120 Credits	4
Additional Coursework or Internship		4	
	16		13
Total Credits: 120			

Journalism

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/journalism/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/journalism/#planofstudytext>)

Major Requirements

Major: Journalism

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework with a minimum GPA of 3.00 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Journalism Major		
COMM 101	Majors and Careers in Communication	1
COMM 200	Introduction to Media Writing	3
COMM 310	Advanced Media Writing	3
COMM 320	Communication Research Methods	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media	3
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives: Select 7 COMM prefix courses in consultation with an advisor.		21
Up to 3 additional credits of COMM 496 can be counted toward this elective requirement.		
Total Credits		61

Program Notes:

- Student enrollment is limited to one degree program offered by the Department of Communication.

Minor Requirements

Minor: Journalism

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 245	Principles of Broadcast Production	3
or COMM 310	Advanced Media Writing	
Professional Specialization Electives:		12
COMM 245	Principles of Broadcast Production	
COMM 310	Advanced Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 347	Television On-Air Performance	
COMM 349	Television Studio Production	
COMM 362	Principles of Design For Media	

COMM 421	History of Journalism
COMM 445	Advanced Broadcast Production
COMM 465	Convergence Media

Total Credits**21**

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Large Animal Veterinary Technology

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/large-animal-veterinary-technology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/large-animal-veterinary-technology/>)

The Large Animal Veterinary Technology minor is a unique opportunity for Veterinary Technology students to expand their learning in the area of livestock species and horses. This minor allows for a great deal of flexibility in course selection to meet the needs and interests of the individual student. Coursework focuses on topics such as livestock production, reproduction, and animal behavior. This minor is reserved for Veterinary Technology majors only. Students may earn this minor by completing a minimum of 16 credits. A minimum of eight credits must be completed at NDSU.

Large Animal Veterinary Technology

Department Information

- **Department Location:**
Hultz Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/large-animal-veterinary-technology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/large-animal-veterinary-technology/>)

Minor Requirements

Minor: Large Animal Veterinary Technology

Required Credits: 16

Code	Title	Credits
Required Courses		
ANSC 220	Livestock Production	3
ANSC 260	Introduction to Equine Studies	2
VETS 482L	Large Animal Techniques Laboratory	1
ANSC 463	Physiology of Reproduction	3
Select one Production Course:		3
ANSC 480	Equine Industry and Production Systems	
ANSC 482	Sheep Industry and Production Systems	
ANSC 484	Swine Production/Pork Industry Systems	
ANSC 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
Elective Courses: Select 4 credits from the following:		4
AGEC 242	Introduction to Agricultural Management	
ANSC 260L	Equine Care and Management Practicum	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 312	Bovine Pregnancy Diagnosis and Ultrasonography	
ANSC 323	Fundamentals of Nutrition	
ANSC 378	Animal Health Management ((Equine/domesticated livestock species only))	
ANSC 393	Undergraduate Research	
ANSC 463L	Physiology of Reproduction Laboratory	
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.
- This minor can only be earned by students pursuing a Veterinary Technology major.

Logistics Management

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/mm/ (<http://www.ndsu.edu/business/departments/mm/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/logistics-management/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/logistics-management/>)

Minor Requirements

Minor: Logistics Management

Required Credits: 19

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Courses		
AGEC 378	Introduction to Transportation & Logistics	3
BUSN 491	Seminar	1
IME 470	Operations Research I	3

IME 480	Production and Inventory Control	3
MGMT 320	Foundations of Management	3
TL 320	Integrated Supply Chain Management	3
Approved Elective - Must have department approval *		3
Total Credits		19

- * An additional 3-credit 300-400 level course in business, industrial engineering, or agribusiness. Under certain circumstances, a course from other departments may satisfy this requirement. Contact departments for a list of approved courses. Departmental approval is required for any course not completed at NDSU and used to satisfy the minor requirements. Courses may not be taken pass/fail unless approved as an internship.

Minor Requirements and Notes

- To enroll in 300/400 level college of business courses, students must have 2.5 minimum institutional cumulative GPA.
- To complete this minor, students must earn at minimum 2.50 GPA in courses used to satisfy the minor requirements. Courses may not be taken pass/fail. Minors must satisfy all course prerequisites.
- A minimum of 8 credits must be taken at NDSU.

Logistics Management

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/minors/ (<http://www.ndsu.edu/business/programs/undergraduate/minors/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/logistics-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/logistics-management/>)

Logistics Management Minor

Working in conjunction, the College of Business (<https://www.ndsu.edu/business/>), the Upper Great Plains Transportation Institute (<http://www.ugpti.org/>), and the Department of Agribusiness and Applied Economics (<http://www.ag.ndsu.edu/agecon/>) offer a minor in Logistics Management. Companies directly involved with transportation as well as companies in the retail and wholesale sectors increasingly rely on an effective and efficient logistics system to remain competitive. In addition, the public sector also utilizes individuals with logistics and supply chain management skills. Minimum GPA requirements apply to this minor. See Minor Requirements for further information.

Management

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/majors/ (<http://www.ndsu.edu/business/programs/undergraduate/majors/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/management/>)

The management curriculum has been carefully designed to inspire and enable students to meet the demand of today's business and organizational landscapes. Management is an exciting and ever-developing field, and our students are supported by curriculum that fosters critical thinking, interpersonal and communication skills, leadership, analytic skills and global awareness. A success measure of our management program is the

successful placement of our graduates in business, industry, and non-profit organizations, in tandem with their enhanced abilities to plan, organize, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University (NDSU). Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Management major is a four-year program with a curricular blend of general education, pre-professional course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), international exposure, and in-depth management-specific courses. Students pursuing a Management major can also choose the Human Resource Management and/or Supply Chain Management tracks to advance their field-specific skills and knowledge. The program nurtures important business skills and managerial competencies including planning, organizing, problem-solving, analytical ability, communication, teamwork, and leadership. Management students are thus prepared to lead and perform in evolving landscapes of business enterprises and non-profit organizations.

Selective Admission

Students who wish to study management at NDSU enroll as pre-management students in the College of Business for the first semester of their freshman year. Admission to the professional program requires the successful completion of the pre-professional course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.5. Transfer students may also be eligible for immediate admission in the professional program. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their management practice, business challenges and issues.

The Practicum/Internship

Management majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect management concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a management major have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Employment opportunities for management majors are significant as the management function exists in every type of business and organization, whether manufacturing or service, small- or large-sized, for-profit or not-for-profit. Major job categories include human resources, supply chain/operations, project management, product/service management, and general management.

The College

In addition to the management major, the College of Business offers undergraduate majors in accounting, business administration, finance, global business (second major only), marketing, and management information systems. The College of Business also offers six graduate programs including Master of Business Administration, Master of Accountancy, Master of Science in Business Analytics, Master of Managerial Logistics, Master of Transportation and Urban Systems, and Doctorate in Transportation and Logistics.

High School Preparation

It is recommended that high school students interested in studying management at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be of benefit. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may be immediately eligible for admission to the professional program. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
MATH 144		4 ENGL 120	3
PSYC 111		3 TL 116	3
ECON 201		3 ECON 202	3
Gen Ed Wellness		2 Non-Major Elective	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
ACCT 200		3 ACCT 201	3
SOC 110		3 STAT 331	2
PHIL 216		3 Gen Ed Humanities/Fine Arts	3
STAT 330		3 Gen Ed Science & Technology (w/ lab)	4
Gen Ed Science & Technology		3 Non-Major Elective	3
		15	15
Junior			
Fall	Credits	Spring	Credits
ENGL 320		3 BUSN 430	3
FIN 320		3 MGMT 330	3
MGMT 320		3 MGMT 450	3
MRKT 320		3 MIS 320	3
Gen Ed Cultural Diversity		3 300-400 Level Business Elective	3
		15	15
Senior			
Fall	Credits	Spring	Credits
TL 360		3 BUSN 489	3
300-400 Level Management Electives (2)		6 300-400 Level Management Electives (2)	6
300-400 Level Business Elective		3 300-400 Level Business Elective	3
Non-Major Elective		3 300-400 Level Elective	3
		15	15
Total Credits: 120			

Note: Management majors can pursue a human resource management track and/or a supply chain management track as part of their program, provided that the 300-400 level business, management, and free electives taken meet the track(s) requirements.

Management

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**

701-231-8651

• **Department Web Site:**www.ndsu.edu/business/departments/mm/ (<http://www.ndsu.edu/business/departments/mm/>)• **Credential Offered:**

B.S.

• **Plan Of Study Sample:**bulletin.ndsu.edu/programs-study/undergraduate/management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/management/#planofstudytext>)

Major Requirements

Major: Management

Degree Type: B.S.**Minimum Credits Required for Degree:** 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
All courses taken for the Management Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300 - 400 level courses, and to graduate.		
Admission to Professional Program Requirements		

COMM 110	Fundamentals of Public Speaking (May satisfy general education category C)	3
ECON 201 or ECON 202	Principles of Microeconomics (May satisfy general education category B and G) Principles of Macroeconomics	3
ENGL 120	College Composition II (May satisfy general education category C)	3
MATH 144	Mathematics for Business	4
PSYC 111 or SOC 110	Introduction to Psychology Introduction to Sociology	3
Management Major Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics (May satisfy general education category A)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
ECON 201 or ECON 202	Principles of Microeconomics (May satisfy general education category B and G) ¹ Principles of Macroeconomics	3
PSYC 111 or SOC 110	Introduction to Psychology ¹ Introduction to Sociology	3
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
Admission to Professional Program Required prior to taking the following courses:		
FIN 320	Principles of Finance ²	3
MGMT 320	Foundations of Management ²	3
MRKT 320	Foundations of Marketing ²	3
MIS 320	Management Information Systems ²	3
BUSN 430	Legal and Social Environment of Business ²	3
BUSN 489	Strategic Management (Capstone Course) ²	3
MGMT 330	Foundations of Organizational Behavior	3
TL 360	Operations Management	3
MGMT 450	Human Resource Management	3
Management Elective Courses (MGMT Prefix) 300-400 Level		12
Select courses from current MGMT curriculum		
Management Elective Courses 300-400 Level		9
Select courses from within the CoB, Prefixes of BUSN, MRKT, FIN, ACCT, MIS, ENTR (includes courses cross-listed with CoB courses) as well as TL 320 and TL 462.		
Management Elective Course 300-400 Level		3
This 300-400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300 - 400 level course. It cannot be used to satisfy other requirements (includes courses cross-listed with CoB courses)		
At least one of the following international courses must be included in the plan of study and can count in one of the management 300-400 level elective areas:		
BUSN 340	International Business	
BUSN 341	Global Business Environment	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	

Total Credits**93**

¹ Take the second course of the pair, which was not taken for the admission into the professional program.

² Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students follow the published curricula for the management program of study from the semester/year of entrance in the College of Business (CoB) to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.

- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the (CoB); such courses may be eligible for use as degree electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the Management major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Student may choose to take the Human Resource Management Track or the Supply Chain Management Track within the Management major:

Human Resources Management Track

Code	Title	Credits
MGMT 452	Compensation Management	3
Select two of the following:		6
MGMT 451	Negotiation and Alternative Dispute Resolution	
MGMT 453	Understanding and Managing Diversity in Organizations	
MGMT 454	Labor-Management Relations	

Supply Chain Management Track

Code	Title	Credits
TL 320	Integrated Supply Chain Management	3
TL 462	Modeling the Supply Chain	3
Select one of the following:		3
MGMT 451	Negotiation and Alternative Dispute Resolution	
MRKT 430	Sales and Personal Selling	
MRKT 438	Customer Relationship Management (CRM) and Sales Technology	
MRKT 460	Marketing Strategy	
AGEC 378	Introduction to Transportation & Logistics	

Management Communication

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/management-communication/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/management-communication/>)

Management Communication is one of four majors offered by the Department of Communication. Students study various communication techniques necessary for success in the workplace, including organizational communication, risk and crisis communication, leadership communication, team-based communication, and conflict communication.

Why Choose a Major in the Department of Communication?

Our students pursue degrees in Communication because they are interested in fast-paced careers where every day brings something new. They want to make a difference in the world while doing something they love – whether that’s reporting breaking news, designing advertisements, running social media campaigns, promoting organizations, or leading others in the workplace.

As a Management Communication major, you will get:

- **More time to explore your interests.** We give you the first year to explore your options, making it possible to switch between **four different COMM majors** without extending your graduation timeline.
- **Guidance on choosing a career.** In COMM 101: Majors and Careers in Communication, you will meet others in your major, learn more about possible careers, and find campus resources that help you achieve your professional goals.
- **Hands-on learning.** You’ll have multiple ways to apply what you are learning through course projects, consulting for local organizations, and participating in national competitions.
- **Built-in communities.** You can connect with other students - while building your resume - through the **eight student organizations** affiliated with our department.
- **Professional experience.** We help you find and benefit from internships in your field through our relationships with local and regional employers.

Management Communication Major

A major in management communication trains students to be effective managers and leaders in corporate or non-profit environments. Students will complete an applied capstone course in their final semester. Students majoring in management communication may earn a Bachelor of Science degree (includes an approved minor) or a Bachelor of Arts degree (includes a modern language proficiency).

Admission to the Major

Students complete 18 credits of Pre-Communication courses with a minimum 3.00 GPA to be admitted to the professional program in management communication. These courses include COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for management communication students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with a variety of private companies, non-profit organizations, and government agencies. Internships often lead to jobs.

Career Opportunities

Coursework in the management communication major prepares students for careers in college admissions, corporate training, consulting, human resource administration, organizational communication, and project management. The coursework emphasizes written and oral communication skills and prepares students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in management communication are encouraged to join the Management Communication Club for undergraduate research and consulting opportunities. They may also be interested in joining the department’s chapter of the Public Relations Student Society of America (PRSSA). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

A well-rounded high school education with experiences in high school music, forensics, theatre, journalism, student government, or scouting serves as good preparation for the management communication major. Students with interests in science and art, business and service, and publicity and promotion will find a major in this department to be a good fit.

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit **the department website** for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research. We encourage students who want to learn more about management communication to reach out via email or schedule an appointment via **Navigate**.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 101		1 COMM 110	3
COMM 112		3 COMM 216 (Major Elective)	3
COMM 114		3 ENGL 120	3
ENGL 110 (or placement)		3 Humanities/Arts GE	3
Quantitative Reasoning GE		3 Science/Technology GE	3
Wellness GE		2 Science/Technology Lab GE	1
		15	16
Second Year			
Fall	Credits	Spring	Credits
COMM 212		3 COMM 315	3
COMM 220		3 COMM 320	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Humanities/Arts GE		3 Global Perspectives GE	3
Science/Technology GE		3 Science/Technology GE	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
COMM 383		3 COMM 496	3
Major Elective		3 Major Elective	3
Minor or Language Coursework		3 Major Elective	3
AHSS Requirement		3 Minor or Language Coursework	3
Upper Division Writing		3 AHSS Requirement	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
COMM 431		3 COMM 483	3
Major Elective		3 Major Elective	3
Major Elective		3 Minor or Language Coursework	3
Minor or Language Coursework		3 Additional Coursework May Be Required to Reach 120 Credits	4
Additional Coursework or Internship		4	
		16	13

Total Credits: 120

Management Communication

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**

701-231-7705

- **Department Web Site:**

www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)

- **Credential Offered:**

B.S.; B.A.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/management-communication/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/management-communication/#planofstudytext>)

Major Requirements

Major: Management Communication

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Pre-Communication Requirements		
Students must complete the following 18 credits of coursework with a minimum GPA of 3.00 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Management Communication Major		
COMM 101	Majors and Careers in Communication	1
COMM 315	Small Group Communication	3
COMM 320	Communication Research Methods	3
COMM 383	Organizational Communication I	3
COMM 431	Communication Ethics and Law	3
COMM 483	Organizational Communication II	3
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives:		21
COMM 216	Intercultural Communication	
COMM 308	Business and Professional Speaking	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and Communication	

COMM 442	Digital Media and Society	
COMM 450	Issues in Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
PSYC 221	Psychology Applied to Work	
SOC 233	Sociology of Organizations and Work	
Total Credits		61

Program Notes:

- Student enrollment is limited to one degree program offered by the Department of Communication.

Minor Requirements

Minor: Management Communication

Required Credits: 21

Code	Title	Credits
COMM 212	Interpersonal Communication	3
COMM 383	Organizational Communication I	3
COMM 483	Organizational Communication II	3
Professional Specialization Electives:		12
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and Communication	
COMM 450	Issues in Communication	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
COMM 487	Organizational Power and Leadership	
Total Credits		21

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Management Information Systems

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/majors/ (<http://www.ndsu.edu/business/programs/undergraduate/majors/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/management-information-systems/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/management-information-systems/>)

The management information systems (MIS) program is designed for those students who wish to prepare themselves for professional careers in information processing or information systems in business and government. The program develops technical skills and administrative insights required for the design, development, implementation, maintenance and management of organizational information systems.

Background Information

MIS emphasizes the collection, organization, analysis and dissemination of information for the planning and control of business or organizational operations. The program prepares graduates to build information systems for the present and the future. The student learns how to handle the complex problems of building a bridge between the computer science professional, who has a technical orientation, and the managerial individual, who has a functional perspective.

Another objective of the program is to provide students with both theoretical knowledge and hands-on experience. The program requires a practicum. Practical experience enables graduates to become productive in any setting more quickly. Further, hands-on experience provides excellent motivation and concrete models for advanced course work. Graduates of the program find employment in a wide variety of settings.

The Program

North Dakota State University's MIS program is a unique collaborative effort by the faculty of two distinct disciplines: business administration and computer science. The Bachelor of Science degree provides sufficient background and skills to support a successful career in technical computing (e.g., as a programmer, systems analyst, systems designer, etc.), systems or network administration, database administration, information technology management, sales or technical sales support.

Selective Admission

Admission to the pre-MIS phase of the program is open to any student who is admitted to NDSU. During the pre-MIS phase, a set of rigorous courses taken in business, computer science and mathematics is designed to give the student the proper background for the core courses. Pre-MIS majors are then admitted to the professional program after completing the pre-professional courses required for professional program admission (i.e., ENGL 120, COMM 110, MATH 144, ECON 201 or ECON 202, and PSYC 111 or SOC 110) and have earned a cumulative GPA of at least a 2.5. Transfer students with appropriate course work may be admitted directly into the professional program. Contact a professional advisor in the College of Business for more information.

Computing Facilities

The computer facilities at NDSU are among the best in the country. The Quentin Burdick Building (QBB) houses the academic host server for the North Dakota University System's 11 colleges and universities and their 48,000 students. Faculty, staff and students may use a variety of computing systems ranging from multi-user host systems to microcomputers, all connected on a 100 MB, full-duplex, fiber-optic high-speed campus network, a high-speed statewide network and then onto the Internet. The campus network is the largest network in the state, consisting of over 6,500 data ports in 35 buildings. Wireless access is available in most campus buildings, including residence halls, and in two outdoor green spaces.

Open access microcomputer clusters are located in 26 buildings on the campus. These clusters house 495 PCs and 65 Macintosh computers along with printers and scanners. Some of these clusters are open 24 hours a day. The computers are equipped with the most commonly used software, e.g., Microsoft Office, Adobe Photoshop, AutoCad, SPSS, etc. Students can use these computers as stand-alone workstations, to access host systems, or to communicate via the Internet with other students and professionals throughout the world. These clusters are open to all students at NDSU. All residence halls are wired to the campus network, making it easy for students with computers to access remote information for course work and various investigations.

In addition to the open access microcomputer clusters, the MIS program and the computer science department maintain two special-purpose clusters housing approximately 170 computers for use by the students in their respective programs. These clusters include a computer structures and networking laboratory, and a network and server laboratory.

NDSU has assumed a leadership role in computer networking as part of a six-state consortium for extremely high-level networking in the Upper Midwest and connectivity to the National Science Foundation supercomputer centers. NDSU is a charter member of Internet 2 and has connectivity with the national vBNS research network.

NDSU also houses a Center for High Performance Computing (CHPC) that provides access to secure, advanced scientific computing resources. The CHPC is a member of the Coalition of Academic Scientific Computation, a nonprofit organization of supercomputing centers and research universities that offer leading edge hardware, software, and expertise in high performance computing resources.

Career Opportunities

As an MIS specialist, one might choose a job in business, education, research, agriculture, or government. This work may be in areas such as systems analysis, management information processing, database, telecommunications/networks, software systems, simulation models, design and development of new computer systems or management. The Federal Bureau of Labor Statistics expects job opportunities in information systems to be a very attractive career path in the foreseeable future.

High School Preparation

It is recommended that high school students interested in studying MIS at the university level take the maximum number of math courses offered at the high school level. High school electives in the social sciences, English and communication also would be of benefit. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
ENGL 110		3 COMM 110	3		
TL 116		3 ENGL 120	3		
Gen Ed Cultural Diversity		3 PSYC 111 or SOC 110	3		
Gen Ed Humanities/Fine Arts		3 MATH 144	4		
Non-Major Elective		3 Non-Major Elective	3		
		15	16		
Sophomore					
Fall	Credits	Spring	Credits		
ACCT 200		3 ACCT 201	3		
CSCI 227		3 CSCI 228	3		
ECON 201		3 ECON 202	3		
STAT 330		3 PHIL 216	3		
Gen Ed Science & Tech (w/ lab)		4 STAT 331	2		
		Gen Ed Wellness	2		
		16	16		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
MGMT 320		3 BUSN 430	3	MIS 397 ¹	3
MRKT 320		3 ENGL 320	3		
MIS 320		3 FIN 320	3		
MIS 315		3 MIS 350	3		
Programming Language Elective		3 MIS 375	3		
		15	15		3
Senior					
Fall	Credits	Spring	Credits		
CSCI 312		3 BUSN 489	3		
MIS 376		3 TL 360	3		
Technology Elective I		3 MIS 470	3		
300-400 Level Business Elective		3 Gen Ed Science & Tech	3		
Technology Elective II		3 Technology Elective II	3		
		15	15		
Total Credits: 126					

¹ Students must complete one of the following options: MIS 397 Cooperative Education, UNIV 492 Study Abroad, MIS 413 Service Internship, CSCI 445 Software Projects Capstone, or AGECE 371 Export Management. Requires MIS 320 as a pre-requisite and faculty advisor's prior approval.

NOTE: This is only a sample curriculum; actual schedules will depend on course availability and individual choices. Students are encouraged to meet with their academic advisor on a regular basis to review their plan of study.

Management Information Systems

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/afis/ (<http://www.ndsu.edu/business/departments/afis/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/management-information-systems/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/management-information-systems/#planofstudytext>)

Major Requirements

Major: Management Information Systems

Degree Type: B.S.

Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

- * May be satisfied by completing courses in another General Education category.
- † General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
All courses taken for the Management Information Systems Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300 - 400 level courses, and to graduate.		
Admission to the Professional Program		
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C) *	3
ENGL 120	College Composition II (May satisfy general education category C) *	3
ECON 201 or ECON 202	Principles of Microeconomics (May satisfy general education category B and G) *	3
MATH 144	Mathematics for Business *	4
PSYC 111 or SOC 110	Introduction to Psychology (May satisfy general education category B) *	3
Management Information System Major Requirements		
ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics (May satisfy general education category A) *	3
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
STAT 331	Regression Analysis *	2
CSCI 227	Computing Fundamentals I (Fall) *	3
ECON 201 or ECON 202	Principles of Microeconomics ²	3
CSCI 228	Computing Fundamentals II (Spring) *	3
ENGL 320	Business and Professional Writing	3
Admission to the Professional Program required prior to taking the following courses		
FIN 320	Principles of Finance ¹	3
MGMT 320	Foundations of Management ¹	3
MGMT 360	Operations Management	3
MRKT 320	Foundations of Marketing ¹	3
BUSN 430	Legal and Social Environment of Business ¹	3
BUSN 489	Strategic Management (Capstone Course) ¹	3
MIS 320	Management Information Systems ¹	3
MIS 315	System Analysis and Design (requires a grade of C or better)	3
MIS 350	Enterprise Systems	3
MIS 375	Database Design for Business Application (S)	3
MIS 376	Data and Telecommunications Administration (F)	3
MIS 470	Information Systems (S)	3
CSCI 312	Survey of Programming Languages (F)	3
Management Information Systems Practicum		
Student must complete one of the following options:		3
MIS 397	Fe/Coop Ed/Internship	
MIS 413	MIS Service Internship	
MGMT 470	Entrepreneurship/Small Business Management	
AGEC 371	Export Management	
Elective Requirements for MIS Major (Elective courses can only be used to fulfill ONE requirement) **		

1) Programming Elective: Select one course from the following or an intermediate or advanced CSCI course that was not the teaching language of CSCI 227 or CSCI 228.	3
CSCI 125	Beginning COBOL
CSCI 172	Intermediate Visual BASIC
CSCI 213	Modern Software Development
CSCI 371	Web Scripting Languages
ECE 173	Introduction to Computing
2) Technology Elective I: Any 300-400 level CSCI or MIS class not used to satisfy another MIS program requirement or	3
ECE 173	Introduction to Computing
ECE 275	Digital Design
CSCI 125	Beginning COBOL
CSCI 172	Intermediate Visual BASIC
CSCI 213	Modern Software Development (if not taken as a programming elective)
CSCI 222	Discrete Mathematics
CSCI 277	Introduction to UNIX
CSCI 345	Topics on Personal Computers
CSCI 371	Web Scripting Languages
CSCI 469	Network Security
CSCI 473	Foundations of the Digital Enterprise
CSCI 488	Human-Computer Interaction
CSCI 489	Social Implications of Computers
MIS 340	Applied Business Intelligence
MIS 412	Computer Crime, Forensics, and Investigation
MIS 460	Enterprise Infrastructure I
MIS 479	Business Data Mining and Predictive Analytics
IME 456	Program and Project Management
3) Technology Elective II: Take two courses from IME 456 or any 300 or 400 level CSCI or MIS course not used to satisfy another MIS major requirement	6
4) Business Elective: Any 300-400 level CoB course not used to satisfy other major requirements, CSCI 473, or ECON 324. (Excludes internships, study abroad, LEAD courses & MIS 371; includes courses cross-listed with CoB courses)	3
Total Credits	102

- * Pre-college and pre-management information systems major courses. A grade of 'C' or better for pre-college and pre-management information systems major courses is required for admission into the Management Information Systems major.
- 1 Denotes Common Body of Knowledge (CBK) course.
- 2 Take course not taken prior to admission to professional program

Degree Requirements and Notes

- Students follow the published curricula for management information systems program of study from the semester/year of entrance in the College of Business to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the College of Business (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission to the MIS major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II and all 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options).
- Requirements for graduation are those in existence at the time of admission to the MIS major.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the MIS major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.

- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Prerequisite for Management Information Systems Practicum: MIS 320 with a grade of C or better.

Minor Requirements

Minor: Management Information Systems

Required Credits: 21

Students should refer to www.ndsu.edu/business (<https://www.ndsu.edu/business/>) for information on declaring the minor with the CoB.

Code	Title	Credits
Requirements		
MGMT 320	Foundations of Management	3
MIS 315	System Analysis and Design	3
MIS 375	Database Design for Business Application *	3
or CSCI 366	Database Systems	
MIS 376	Data and Telecommunications Administration *	3
or CSCI 459	Foundations of Computer Networks	
CSCI 227	Computing Fundamentals I **	3-4
or CSCI 160	Computer Science I	
Select one of the following:		3
ACCT 420	Accounting Information Systems	
MIS 470	Information Systems	
Or an MIS advisor-approved CoB course that is MIS related		
Select one of the following:		3
An MIS adviser approved 300-400 level CSCI course		
Or one of the following:		
CSCI 122	Visual BASIC	
CSCI 161	Computer Science II	
CSCI 172	Intermediate Visual BASIC	
CSCI 228	Computing Fundamentals II **	
Total Credits		21-22

* Students who take CSCI 366 Database Systems & CSCI 459 Foundations of Computer Networks, must select an additional MIS advisor-approved CoB course.

** It is strongly recommended that students who take CSCI 227 select CSCI 228 as their elective in preparation for MIS 315.

Minor Requirements and Notes

- A minimum of 9 credits must be completed in the CoB.
- Approval forms must be submitted after completed CSCI 227 Computing Fundamentals I or CSCI 160 Computer Science I.
- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA. To complete a minor, students must earn at least a 2.50 GPA that is based on the courses used to satisfy the minor requirements. Courses may not be taken pass/fail.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for the CoB courses until the cumulative GPA returns to 2.50 or above.
- Students are subject to the minor requirements in effect during the year in which the minor was approved.
- Minors must satisfy all course prerequisites.
- Approval for a minor does not guarantee enrollment in specific courses.
- Graduation with a minor in Management Information Systems requires a grade of 'C' or better in all courses required for the minor.

Managerial Psychology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**

701-231-8622

- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/managerial-psychology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/managerial-psychology/>)

Minor Requirements

Minor: Managerial Psychology

Required Credits: 18

Code	Title	Credits
PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3
PSYC/SOC 214 or PSYC 216	Social Interaction Cultural Psychology	3
PSYC 221	Psychology Applied to Work	3
PSYC 322	Judgment & Decision-Making	3
PSYC 453 or PSYC 457	Organizational Psychology Managing Work Motivation and Morale	3
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Managerial Psychology

Department Information

- **Department Location:**
Minard Hall 232
- **Department Phone:**
701-231-8622
- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/managerial-psychology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/managerial-psychology/>)

The Department of Psychology offers a managerial psychology minor that fills the need of many students who want essential training in behavior relevant to management in organizations which would help them in their professional careers as well as personal lives. The minor follows a number of themes important for NDSU students' in their future working lives: (1) managerial behavior derived from learning self-management, (2) managerial behavior derived from knowing and understanding others, and their diversity, (3) learning the broad implications of psychology for working with others, (4) recognizing the judgment, problem solving, and decision making foundation of managerial behavior, and (5) developing an understanding of the intrapersonal, interpersonal and organizational contexts of managerial behavior.

Manufacturing Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering 202
- **Department Phone:**

701-231-9818

- **Department Web Site:**

www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)

- **Credential Offered:**

B.S.Mfg.E.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/manufacturing-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/manufacturing-engineering/>)

Manufacturing engineers make things. Everything manufacturing engineers do is ultimately tied to the production of goods. Almost everything we use, whether at home, at work, or at play, is manufactured. By its official professional definition, manufacturing occurs when the shape, form or properties of a material are altered in a way that adds value. Manufactured goods are everywhere: aircraft structures, machinery, electronics, medical devices, automobile parts, household products, toys, textiles and clothing, cans and bottles—virtually everything we use.

The Profession

Everything needed in modern society is manufactured. Manufacturing engineers design, direct and coordinate the processes and production systems for making virtually every kind of product from beginning to end. As businesses try to make products better and at a lower cost, they turn to manufacturing engineers to find out how.

Manufacturing engineers apply scientific principles to the production of goods. They are key team members in production of a wide range of products: automobiles, airplanes, tractors, electronics, surgical instruments, toys, building products, foodstuffs, sports and recreational equipment, and more. In all cases, manufacturing engineers design the processes and systems to make products with the required functionality, to high quality standards, available when and where customers prefer, at the best possible price and in ways that are environmentally friendly.

The Program

The Department of Industrial and Manufacturing Engineering (IME) at North Dakota State University offers two programs leading to either a Bachelor of Science degree in Manufacturing Engineering or Industrial Engineering and Management. Both programs are accredited by the Engineering Accreditation Commission of ABET, www.abet.org.

As a graduate of manufacturing engineering, you will have the opportunity to design systems and processes that improve the quality and productivity of an organization's business activities. You will employ a strong base of fundamental engineering and management skills to effectively integrate people, technology, machines and money to create positive change. Quite simply, you will design and implement the best way to make things.

Faculty and Facilities

The faculty and staff members in the department have extensive experience in industrial and manufacturing specialties. The IME faculty and staff will know your name, understand your potential and problems, and will offer encouragement when you need it. When you leave NDSU, you will have built excellent capabilities for career success, the confident ability for lifelong personal growth, and a network of friends and professional colleagues.

The department has 7 laboratories with a significant amount of equipment that provide valuable services in support of students' educational needs. The departmental laboratories include manufacturing, rapid prototyping, CNC, machining, microfabrication, welding, electronics, precision manufacturing, automation and robotics, and PLC, as well as computer simulation, quality & reliability, SPACHES, and human factors.

Career Opportunities

The IME programs at NDSU can help you to open the door to various opportunities for starting your professional career in a wide range of industries or to seek advanced degrees at NDSU or another institution. The IME programs will help you to develop a strong basis in general education and engineering fundamentals that provide the foundation for a very wide range of career choices and for a lifetime of growth. IME programs will help you develop industry-standard skills you can use to open the door to many career opportunities that can offer you financial rewards and exceptional professional success.

Manufacturing engineering graduates have become a source of talent working in industries that produce such products as biomedical devices, microelectronics, transportation and construction equipment, aircraft and spacecraft, and processed foods. Recent IME graduates command starting salaries in the top rank of engineering disciplines. According to Payscale.com, the national average salary was \$70,000 in February of 2020 (https://www.payscale.com/research/US/Job=Manufacturing_Engineer/Salary (https://www.payscale.com/research/US/Job=Manufacturing_Engineer/Salary/)).

Transfer Admission

Students who have studied two years of pre-engineering at another institution may be able to transition into the manufacturing engineering program with no loss of credits. Students who transfer with an AA or AS degree will have lower division general ed credits satisfied.

Scholarship and Financial Aid

The Department of Industrial and Manufacturing Engineering awards several scholarships annually. Scholarships are available for incoming freshman, transfer students and currently enrolled students. Other forms of financial aid are available through the Office of Financial Aid and Scholarships.

Selective Admission

The Department of Industrial and Manufacturing Engineering has minimum admission requirements for transfer students. Transfer students must have a minimum grade point average of 2.3.

MANUFACTURING Engineering Minor

Students majoring in any engineering discipline may elect a minor in Manufacturing Engineering. These optional studies offer engineering students the opportunity to add important career-enhancing skills to their technological competencies. Total requirement is 18 credits (12 credits are required courses and 6 credits of approved electives).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
CHEM 121 & 121L		4 IME 111	3
ENGL 110		3 MATH 166	4
ENGL 120		3 ME 212	3
MATH 165		4 ME 221	3
COMP SCI ELECTVE (Select from approved list of electives)		3 CHEM 122	3
		17	16
Sophomore			
Fall	Credits	Spring	Credits
COMM 110		3 IME 311	3
IME 330		3 MATH 266	3
MATH 128		1 PHYS 252 & 252L	5
MATH 259		3 ME 331	4
ME 222		3 CE 309	3
ME 223		3	
		16	18
Junior			
Fall	Credits	Spring	Credits
IME 380		3 IME 431	3
IME 430		3 IME 440	3
IME 460		3 IME 461	3
ENGL 321		3 ME 350	3
IME 456		3 GEN ED HUM/FA and GLOBAL PERSPECTIVES	3
GEN ED WELLNESS		2	
		17	15

Senior			
Fall	Credits	Spring	Credits
ENGR 402		1 IME 489	3
IME 480		3 ENGR SCI ELECTIVE (Select from approved list of electives)	3
IME 482		3 GEN ED SOCIAL& BEHAVIORAL SCI	3
GEN ED SOCIAL & BEHAVIORAL SCI AND CULTURAL DIVERSITY		3 TECHNICAL ELECTIVE (Select from approved list of tech electives)	3
GEN ED HUMANITIES/FINE ARTS		3 TECHNICAL ELECTIVE (Select from approved list of tech electives)	3
TECHNICAL ELECTIVE (Select from approved list of tech electives)		3	
			16
			15

Total Credits: 130

Manufacturing Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering
- **Department Phone:**
701-231-9818
- **Department Web Site:**
www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)
- **Credential Offered:**
B.S.Mfg.E.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/manufacturing-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/manufacturing-engineering/#planofstudytext>)

Major Requirements

Major: Manufacturing Engineering

Degree Type: B.S.Mfg.E.

Minimum Degree Credits to Graduate: 131

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Manufacturing Engineering Core Requirements		
IME 111	Introduction to Industrial and Manufacturing Engineering	3
IME 311	Work/Station Design and Measurement	3
IME 330	Manufacturing Processes	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3
IME 440	Engineering Economy	3
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 489	Industrial and Manufacturing Engineering Capstone	3
MATH 128	Introduction to Linear Algebra	1
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Manufacturing Electives		
Computer Science Electives: Select 3 credits from the following:		3
CSCI 122	Visual BASIC	

CSCI 159	Computer Science Problem Solving	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	
Engineering and Science Electives: Select a minimum of 9 credits from the following:		
CE 309	Fluid Mechanics	3
ME 350	Thermodynamics and Heat Transfer	3
Select one of the following:		3-4
EE 206	Circuit Analysis I	
ECE 275	Digital Design	
ECE 301	Electrical Engineering I	
Technical Electives: Select 9 credits from the following:		9
IME 335	Welding Technology	
IME 411	Human Factors Engineering	
IME 427	Packaging for Electronics	
IME 432	Composite Materials Manufacturing	
IME 433	Additive Manufacturing	
IME 435	Plastics and Polymer Processing in Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 462	Total Quality In Industrial Management	
IME 463	Reliability Engineering	
IME 464	Reliability Analysis	
IME 465	Introduction to Machine Learning	
IME 470	Operations Research I	
IME 472	Simulation of Business and Industrial Systems	
IME 485	Industrial and Manufacturing Facility Design	
Only one of the following five courses may be counted as technical electives.		
BUSN 340	International Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MIS 320	Management Information Systems	

Total Credits**107-108**

Degree Requirements and Notes

- Grades less than 'C' will not be accepted for required courses in CHEM, MATH, and PHYS.
- Students may request approval for other 300-400 level engineering or related courses to be approved as technical electives. To request approval, a student should submit a memo to the IME Department indicating the course of interest and why the course should be approved as a technical elective. This memo will be reviewed by the IME Department Chair for approval.
- 300-400 level BUSN courses require at least junior standing and a minimum 2.50 cumulative GPA.

Minor Requirements

Minor: Manufacturing Engineering

Required Credits: 18

Code	Title	Credits
Required Courses		
IME 330	Manufacturing Processes	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3

Electives: Select 6 credits from the following:**6**

IME 335	Welding Technology
IME 427	Packaging for Electronics
IME 432	Composite Materials Manufacturing
IME 433	Additive Manufacturing
IME 435	Plastics and Polymer Processing in Manufacturing
IME 437	Methods for Precision Manufacturing
IME 461	Quality Assurance and Control
IME 465	Introduction to Machine Learning
IME 482	Automated Manufacturing Systems

Total Credits**18****Minor Requirements and Notes**

- A minimum of 9 credits must be taken at NDSU.
- Only students majoring in an engineering discipline or with department permission agricultural or physical science majors may elect a minor in Manufacturing Engineering.

Marketing

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/undergraduate/majors/ (<http://www.ndsu.edu/business/programs/undergraduate/majors/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/marketing/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/marketing/>)

Marketing is a primary function of organizations to ensure the needs of customers and external constituents are met. The marketing curriculum is carefully designed to ensure students have understanding of how to successfully manage products, price, place and promotion, and have analytical and interpersonal skills. A success measure of our marketing program is the successful placement of our graduates in business, industry, and non-profit organizations, in tandem with their enhanced abilities to manage marketing mix, analyze markets, work as a team, and make sound decisions.

Background Information

The Association to Advance Collegiate Schools of Business (AACSB International) accredits the undergraduate and graduate programs in the College of Business at North Dakota State University. Our College of Business is one of only two AACSB-accredited schools of business in North Dakota.

AACSB International is one of higher education's most prestigious and rigorous accrediting bodies, emphasizing a commitment to continuous improvement, innovation, engagement, and impact in business education. Less than 10 percent of business programs worldwide have this accreditation, highlighting the academic excellence of our College of Business at NDSU.

The Program

The Marketing major is a four-year program with a curricular blend of general education, pre-professional course work, fundamental business knowledge (accounting, finance, management, marketing, and information systems), international exposure, and in-depth marketing-specific courses. Students in the Marketing major can also choose the Supply Chain Management track and/or pursue the Certificate in Professional Selling to advance their field-specific skills and knowledge. The program nurtures important business skills and marketing competencies including managing marketing mix (price, product, promotion, and place), analytical ability, interpersonal skills, and teamwork. Marketing students are thus prepared to perform the marketing function and activities in business enterprises and non-profit organizations.

Selective Admission

Students who wish to study marketing at NDSU enroll as pre-marketing students in the College of Business for the first semester of their freshman year. Admission to the professional program requires the successful completion of the pre-professional course requirements (ENGL 120, COMM 110, MATH 144, ECON 201 or 202, and PSYC 111 or SOC 110) and a minimum cumulative grade point average (GPA) of 2.5. Transfer students may also be eligible for immediate admission in the professional program. Contact a College of Business professional advisor for more information.

The Faculty

To provide a rigorous and relevant educational experience to our students, faculty in our program are highly qualified in their respective areas of expertise. Our faculty have been recognized for their teaching excellence by their students and colleagues and for their outstanding research by their peers. They employ a wide variety of instructional techniques and embed both classical and cutting-edge knowledge into their classes. They remain current in their fields by actively engaging in research and/or with firms and business professionals regarding their marketing practice, business challenges and issues.

The Practicum/Internship

Marketing majors are encouraged to complete practicum experiences, ideally at the end of sophomore and junior years. The practicum is designed to enable our students to connect marketing concepts learned in the classroom with live business situations and to broaden their horizons beyond the classroom setting. The practicum also gives students a competitive edge in job placement.

Career Opportunities

Graduates with a marketing major have career opportunities in business, industry, government service, and the non-profit sector, both regionally and globally. Employment opportunities for marketing majors are significant as the marketing function exists in every type of business and organization, whether for-profit or not-for-profit. Major job categories include sales, retailing, product/service management, advertising and promotion, and market research.

The College

In addition to marketing major, the College of Business offers undergraduate majors in accounting, business administration, finance, global business (second major only), management, and management information systems. The College of Business also offers six graduate programs including Master of Business Administration, Master of Accountancy, Master of Science in Business Analytics, Master of Managerial Logistics, Master of Transportation and Urban Systems, and Doctorate in Transportation and Logistics.

High School Preparation

It is recommended that high school students interested in studying marketing at the university level take mathematics courses at least through pre-calculus. High school electives in the social sciences, communication, and English also would be of benefit. Students who have satisfactorily completed Advanced Placement courses in Calculus, Economics, English, Communication, and Psychology or Sociology may directly apply for admission to the professional program. Please speak with a professional advisor in the College of Business for more information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
MATH 144		4 ENGL 120	3
PSYC 111		3 TL 116	3
ECON 201		3 ECON 202	3
Gen Ed Wellness		2 Non-Major Elective	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
ACCT 200		3 ACCT 201	3
SOC 110		3 STAT 331	2
PHIL 216		3 Gen Ed Science & Technology (w/ lab)	4
STAT 330		3 Gen Ed Humanities/Fine Arts	3
Gen Ed Science & Technology		3 Non-Major Elective	3
		15	15

Junior			
Fall	Credits	Spring	Credits
ENGL 320		3 BUSN 430	3
FIN 320		3 MRKT 410	3
MGMT 320		3 MIS 320	3
MRKT 320		3 300-400 Level Marketing Elective	3
Gen Ed Cultural Diversity		3 300-400 Level Business Elective	3
		15	15
Senior			
Fall	Credits	Spring	Credits
MRKT 450		3 BUSN 489	3
300-400 Level Marketing Electives (2)		6 MRKT 460	3
300-400 Level Business Elective		3 300-400 Level Marketing Elective	3
Non-Major Elective		3 300-400 Level Business Elective	3
		300-400 Level Elective	3
		15	15
Total Credits: 120			

Note: Marketing majors can pursue a supply chain management track as part of their program, provided that the 300-400 level business, marketing, and free electives taken meet the track requirements.

Marketing

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/mm/ (<http://www.ndsu.edu/business/departments/mm/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/marketing/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/marketing/#planofstudytext>)

Major Requirements

Major: Marketing

Degree Type: B.S.

Minimum Credits Required for Degree: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
All courses taken for the Marketing Major require a grade of C or better. A minimum 2.5 cumulative GPA is required for admission to the professional program, to enroll in 300 - 400 level courses, and to graduate.		
Admission to the Professional Program Requirements		
COMM 110	Fundamentals of Public Speaking (May satisfy general education category C)	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) ¹	3
or ECON 202	Principles of Macroeconomics	
ENGL 120	College Composition II (May satisfy general education category C)	3
MATH 144	Mathematics for Business	4
PSYC 111	Introduction to Psychology ¹	3
or SOC 110	Introduction to Sociology	
Marketing Major Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
TL 116	Business Software Applications	3
PHIL 216	Business Ethics (May satisfy general education category A)	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
STAT 331	Regression Analysis	2
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) ¹	3
or ECON 202	Principles of Macroeconomics	
PSYC 111	Introduction to Psychology ¹	3
or SOC 110	Introduction to Sociology	
ENGL 320	Business and Professional Writing (May satisfy general education category C)	3
Admission to the Professional Program required prior to taking the following courses:		

FIN 320	Principles of Finance ²	3
MGMT 320	Foundations of Management ²	3
MRKT 320	Foundations of Marketing ²	3
MIS 320	Management Information Systems ²	3
BUSN 430	Legal and Social Environment of Business ²	3
BUSN 489	Strategic Management (Capstone Course) ²	3
MRKT 410	Consumer Behavior	3
MRKT 450	Marketing Research	3
MRKT 460	Marketing Strategy	3
Marketing Elective Courses (MRKT prefix) 300-400 Level		12
Select courses from current MRKT curriculum		
Marketing Elective Courses 300-400 Level		9
Select courses from within the CoB, Prefixes of BUSN, MGMT, FIN, ACCT, MIS, ENTR (includes courses cross-listed with CoB courses) as well as TL 320, TL 360, and TL 462.		
Marketing Elective Course 300-400 Level		3
This 300-400 level elective can be external to the CoB and must be satisfied with a single 3-credit 300 - 400 level course. It cannot be used to satisfy other requirements (includes courses cross-listed with CoB courses)		
At least one of the following international courses must be included in the plan of study and can count in one of the management 300-400 level elective areas:		
BUSN 340	International Business	
BUSN 341	Global Business Environment	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	
Total Credits		93

¹ Take the second course of the pair, which was not taken for admission to professional program.

² Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes:

- Students follow the published curricula for the marketing program of study from the semester/year of entrance in the College of Business (COB) to graduation provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major are subject to meeting the curricular requirements in effect at the time the new major is declared.
- Business courses from programs that do not hold AACSB International accreditation cannot be used for major or minor requirements in the (CoB); such courses may be eligible for use as free electives.
- The CoB accepts a maximum of nine credits of non-NDSU 300-400 level business courses from AACSB programs with approval of the department.
- Admission to the marketing major is required to enroll in the advanced 300 or 400 level courses in the CoB.
- A grade of 'C' or better is required in transfer courses accepted for all accounting, business administration, finance, management, management information systems, and marketing courses.
- No courses for the major may be taken with Pass/Fail grading.
- Requirements for graduation are those in existence at the time of admission to the marketing major.
- Students must earn a 2.50 institutional GPA to graduate.
- Of the credits completed in residence at least 30 credits must be in 300-400 level CoB courses.
- Students must be accepted to the marketing major prior to the completion of the last 30 credits in 300 and 400 level CoB courses.
- A Business Administration minor is NOT offered with this major.
- For multiple majors within the CoB, at least 15 unique credits of 300-400 level CoB courses must exist between the majors.
- Internship and cooperative education credits may be applied toward the total credits required for graduation as non-major electives or 300-400 level electives not used in pre-major categories.
- Student may choose to take the Supply Chain Management Track within the Marketing major:

Supply Chain Management Track

Code	Title	Credits
TL 320	Integrated Supply Chain Management	3
TL 462	Modeling the Supply Chain	3

Select one of the following:

3

TL 360	Operations Management
MGMT 451	Negotiation and Alternative Dispute Resolution
MRKT 430	Sales and Personal Selling
MRKT 438	Customer Relationship Management (CRM) and Sales Technology
AGEC 378	Introduction to Transportation & Logistics

Mathematics

Department Information

- **Department Location:**
Minard Hall 408
- **Department Phone:**
701-231-8171
- **Department Web Site:**
www.ndsu.edu/math/ (<http://www.ndsu.edu/math/>)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics/>)

Mathematics is the language of science and technology. Its explosive development during the 20th Century and its history as the oldest and most highly developed discipline make math one of the most exciting and rewarding areas of study for the 21st Century.

Background Information

In the past few years, a tremendous increase has occurred in the need for mathematics and mathematicians. In such fields as actuarial science, computer science, statistics, engineering, economics and commerce, mathematical training is in high demand.

If you enjoy mathematics and are good at it, you will find both challenges and opportunities in the Department of Mathematics at North Dakota State University. Your advisor, a faculty member in the department, will provide you with information concerning courses, curricula and the many exciting and rewarding careers open to mathematics graduates. The Cooperative Education Program offers the possibility of academic credit for on-the-job training. The student mathematics organization, Math Club, brings in both academic and nonacademic speakers who explore career possibilities and fascinating topics in mathematics at club meetings. Opportunities for paper grading and tutoring are available and allow students to deepen their understanding by assisting others in learning mathematics.

Our faculty members contribute research findings in a variety of areas in theoretical and applied mathematics to internationally known journals. This wide variety of areas of specialization and expertise of faculty members in the department means that you will probably find someone both interested and knowledgeable in any area of mathematics that might fascinate you.

The Program

The Department of Mathematics offers a broad and balanced curriculum of courses taught by a faculty of 15. A student may choose to major in mathematics or mathematics education. Minors in related areas are encouraged. These choices may be made immediately or deferred until the basic course work is completed. In addition to the Bachelor of Science degree, the department offers master's and doctorate degrees.

Career Opportunities

Our students have been very successful in finding employment. Graduates are working in a wide variety of corporations, agencies, universities and school systems. A number continue on for advanced degrees.

The Faculty

A. Akhmedov, Ph.D., Yale, 2004

M.A. Alfonsaca, Ph.D., Universidad Autonoma de Madrid, 2003

N. Barabanov, Ph.D., University of Kiev, 1979

J. Boynton, Ph.D., Florida Atlantic University, 2006

C. Ciuperca, Ph.D., University of Kansas, 2001

D. Cómez, Ph.D., University of Toronto, 1983

J. Dorfmeister, Ph.D., University of Minnesota, 2009

B. Duncan, Ph.D., University of Nebraska - Lincoln, 2004

F. Littmann, Ph.D., University of Illinois at Urbana - Champaign, 2003

A. Novozhilov, Ph.D., Moscow State University of Railway Engineering, 2002

I. SenGupta, Ph.D., Texas A&M, 2010

J. Striker, Ph.D., University of Minnesota, 2008

A. Ungar, Ph.D., University of Tel Aviv, 1973

I. Yegorov, Ph.D., Lomonosov Moscow State University, 2014

The Curriculum

For a mathematics major, 57 credits of mathematics courses are required. The mathematics education major requires 37 credits and emphasizes those areas of mathematics and related disciplines that have proven most useful for secondary school teachers. In addition, there are cooperative double majors in mathematics and computer science, mathematics and physics, and mathematics and statistics, which take advantage of the overlap of requirements and give the student a broader background, thus opening a wider range of career possibilities. Advisors in the Department of Mathematics can furnish details about these and other programs, such as an emphasis in actuarial mathematics.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
MATH 165		4 MATH 166	4
MATH 129		3 MATH 329	3
ENGL 110		3 COMM 110	3
Gen Ed Humanities/Fine Arts		3 ENGL 120	3
		Gen Ed Social/Behavioral Sciences	3
		13	16
Sophomore			
Fall	Credits	Spring	Credits
MATH 265		4 MATH 266	3
MATH 270		3 MATH 346	3
Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)		3 Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
Gen Ed Humanities/Fine Arts & Cultural Diversity		6 Gen Ed Social/Behavioral Sciences & Global Perspectives	6
		16	15
Junior			
Fall	Credits	Spring	Credits
MATH 420		3 MATH 452	3
MATH 450		3 MATH 483	3
Gen Ed Upper Level Writing		3 MATH 300-400 Elective	3
Gen Ed Wellness		2 Gen Ed Science & Tech w/lab	4

MATH 300-400 Elective		3 Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
		14	16
Senior			
Fall	Credits	Spring	Credits
MATH 300-400 Electives		4-6 MATH 491	1
Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)		3 MATH 300-400 Electives	6
Gen Ed Science & Tech		3 Related Required Course (15 credits of a minor or 2nd major or elective with at least two 300+ level courses)	3
Electives		4 Gen Ed Science & Tech	3
		Electives	3
		14-16	16
Total Credits: 120-122			

Mathematics

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8171
- **Department Web Site:**
www.ndsu.edu/math/ (<http://www.ndsu.edu/math/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/mathematics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/mathematics/#planofstudytext>)

Major Requirements

Major: Mathematics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required in all MATH prefix courses.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (includes)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 420	Abstract Algebra I	3
MATH 450	Real Analysis I	3
MATH 452	Complex Analysis	3
MATH 483	Partial Differential Equations	3
MATH 491	Seminar	2
Mathematics Electives		16
MATH prefix courses numbered 300 or higher, not including those listed above.		
Related Required Courses		15

A minor or second major in any other program or 15 credits of coursework that includes at least two 300-level (or higher) courses in another discipline.

Total Credits

72

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Minor: Mathematics

Required Credits: 20

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	3-4
or MATH 266	Introduction to Differential Equations	
Mathematics Concentration: Select one from the following:		3
MATH 270	Introduction to Abstract Mathematics	
MATH 329	Intermediate Linear Algebra	
MATH 346	Metric Space Topology	
MATH Prefix Electives		6
Electives must be MATH courses numbered 266 or higher (only one of the above may be used here: MATH 266, 270, 329, 346).		
Total Credits		20-21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- A grade of 'C' or better is required in all courses used toward this minor.

Mathematics and Physics

Department Information

- **Department Location:**
Minard Hall or South Engineering
- **Department Phone:**
701-231-8171
- **Department Web Site:**
www.ndsu.edu/math/ or www.ndsu.edu/physics/ (<http://www.ndsu.edu/math/> or www.ndsu.edu/physics/)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-physics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-physics/>)

This program is intended for students who desire additional mathematical background and preparation for graduate school or technical careers in the sciences, especially theoretical physics.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
PHYS 171		1 PHYS 251 & 251L	5
MATH 165		4 PHYS 251R	1
CHEM 150 & CHEM 160		4 MATH 166	4
ENGL 110 or 120 (based on placement)		3 COMM 110	3
MATH 129		3 CHEM 151 & CHEM 161	4
		15	17
Sophomore			
Fall	Credits	Spring	Credits
PHYS 252 & 252L		5 PHYS 350	3
PHYS 252R		1 MATH 266	3
MATH 265		4 CSCI 160	4
MATH 270		3 Gen Ed Social/Behavioral Science	3
Gen Ed Humanities/Fine Arts		3 Gen Ed Wellness	2
		MATH 346	3
		16	18
Junior			
Fall	Credits	Spring	Credits
PHYS 360		3 PHYS 361	3
MATH 420		3 PHYS 370	3
PHYS 355		3 ENGL 324	3
MATH 450		3 Gen Ed Social/Behavioral Science	3
Gen Ed Social/Behavioral Science		3 MATH 452 or 483	3
Gen Ed Humanities/Fine Arts		3 MATH 329	3
		18	18
Senior			
Fall	Credits	Spring	Credits
PHYS 462		3 PHYS 486	3
PHYS 485		3 PHYS 489	2
Physics Elective		3 Physics Elective	3
MATH 4XX Math Elective		3 MATH 491	2
PHYS 488		1 Gen Ed Humanities/Fine Arts	3
		13	13

Total Credits: 128

Mathematics and Physics

Department Information

- **Department Location:**
Minard Hall or South Engineering
- **Department Phone:**

701-231-8171

- **Department Web Site:**

www.ndsu.edu/math/ or www.ndsu.edu/physics/ (<http://www.ndsu.edu/math/> or www.ndsu.edu/physics/)

- **Credential Offered:**

B.S.; B.A.

- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/mathematics-physics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/mathematics-physics/#planofstudytext>)

Major Requirements

Major: Mathematics & Physics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required for all MATH, PHYS, and AST prefix courses.

Code	Title	Credits
Mathematics Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
Select any two of the following:		6
MATH 420	Abstract Algebra I	
MATH 450	Real Analysis I	
MATH 452	Complex Analysis	
MATH 483	Partial Differential Equations	
MATH 491	Seminar	2
Physics Major Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics at MSUM)	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory at MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
Physics Electives: Select 3 of the following:		9
PHYS 215	Research For Undergraduates	
PHYS 411	Optics for Scientists & Engineers	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 481	Condensed Matter Physics	

MSUM AST	Astronomy courses (300/400-level) with departmental permission	
Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
Chemistry: Select one of the following (150/160 recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		96

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics and Statistics

Department Information

- **Department Location:**
Minard Hall or Morrill Hall
- **Department Phone:**
701-231-8171
- **Department Web Site:**
www.ndsu.edu/math/ (<http://www.ndsu.edu/math/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-statistics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-statistics/>)

Mathematics and Statistics Double Major

Pre-Actuarial Science Option

Actuarial Science is the study of the evaluation and measurement of risk. The Actuary Science option is a pre-professional program designed to provide the background needed to enter the field. Entrance into the profession is regulated under a system of examinations run by actuarial professional societies. The curriculum for this option is designed to prepare the student to pass several of these examinations.

The nature of the actuarial profession requires its practitioners to have a broad knowledge of finance, law, mathematics, management, and statistics. This option leads to a double major in Mathematics and Statistics with either a minor in Economics or additional courses in business. Students selecting this option are requested to visit with the actuarial advisers in both the Departments of Mathematics and Statistics early and often to confirm their progress and to inform themselves of changes in the examination curriculum.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Math and Statistics

Freshman			
Fall	Credits	Spring	Credits
MATH 165		4 MATH 166	4
MATH 129		3 MATH 329	3
CSCI 160		4 STAT 330	3
ENGL 110 or 120 (based on placement)		3 CSCI 161	4
		COMM 110	3
		14	17
Sophomore			
Fall	Credits	Spring	Credits
MATH 265		4 MATH 266	3
MATH 270		3 MATH 346	3
STAT 367		3 STAT 368	3
Gen Ed Social/Behavioral Science & Global Perspectives		6 Gen Ed Humanities/Fine Arts & Cultural Diversity	6
		16	15
Junior			
Fall	Credits	Spring	Credits
MATH 450		3 MATH 300-400 Elective	3
STAT 461		3 STAT 400 Electives	9
Gen Ed Humanities/Fine Arts		3 Gen Ed Upper Level Writing	3
Gen Ed Social/Behavioral Science		3	
Elective		3	
		15	15
Senior			
Fall	Credits	Spring	Credits
MATH 491		1 STAT 400 Electives	3
STAT 400 Electives		6 Electives	9
Gen Ed Science & Tech w/lab		4 STAT 462 (Capstone)	3
Gen Ed Science & Tech		3	
Gen Ed Wellness		2	
		16	15
Total Credits: 123			

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Math and Statistics (Pre-Actuarial)

Freshman			
Fall	Credits	Spring	Credits
MATH 165		4 MATH 166	4
MATH 129		3 MATH 329	3
STAT 330		3 COMM 110	3
ACCT 200		3 ACCT 201	3

ENGL 110 or 120 (based on placement)		3 CSCI 160		4
		16		17
Sophomore				
Fall	Credits	Spring	Credits	
MATH 265		4 MATH 266		3
MATH 270		3 MATH 346		3
STAT 461		3 Actuarial Elective (One of the following: CSCI 453, 454; ECON 341, 343, 410, 440, 456, 465, 470, 472, 476, 480, 481, 482; FIN 320, 410, 420, 450, 460)		3
CSCI 161		4 Gen Ed Social/Behavioral Science		3
		Stat 400 Elective		3
		14		15
Junior				
Fall	Credits	Spring	Credits	
MATH 450		3 STAT 468		3
STAT 467		3 MATH 300-400 Elective		3
STAT 400 Elective		3 STAT 400 Elective		3
Upper Level Writing		3 Actuarial Elective (One of the following: CSCI 453, 454; ECON 341, 343, 410, 440, 456, 465, 470, 472, 476, 480, 481, 482; FIN 320, 410, 420, 450, 460)		3
Actuarial Elective (One of the following: CSCI 453, 454; ECON 341, 343, 410, 440, 456, 465, 470, 472, 476, 480, 481, 482; FIN 320, 410, 420, 450, 460)		3 Gen Ed Humanities/Fine Arts		3
		15		15
Senior				
Fall	Credits	Spring	Credits	
STAT 400 Elective		3 STAT 476		1
Gen Ed Social/Behavioral Science		6 Gen Ed Science & Tech w/lab		4
Gen Ed Science & Tech		6 Gen Ed Humanities/Fine Arts & Cultural Diversity		6
		Gen Ed Wellness		2
		STAT 462 (Capstone)		3
		15		16

Total Credits: 123

Mathematics and Statistics

Department Information

- **Department Location:**
Minard Hall or Morrill Hall
- **Department Phone:**
701-231-8171
- **Department Web Site:**

www.ndsu.edu/math/ or www.ndsu.edu/statistics/ (<http://www.ndsu.edu/math/> or <http://www.ndsu.edu/statistics/>)

• **Credential Offered:**

B.S.; B.A.

• **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/mathematics-statistics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/mathematics-statistics/>)

Major Requirements

Major: Mathematics & Statistics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. [*]		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences [*]		6

- * Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Mathematics & Statistics Major Requirements

A grade of 'C' or better is required in all MATH and STAT prefix courses.

Code	Title	Credits
Math Major Core Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 450	Real Analysis I	3
MATH 491	Seminar	2
Mathematics Electives	Any 300-400 level	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
Statistics Electives	400 level other than those listed above	18
Related Required Courses:		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Total Credits		76

Major Requirements

Major: Mathematics & Statistics Pre-Actuarial Option

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

A grade of 'C' or better is required for all courses used toward the major.

Code	Title	Credits
Science and Mathematics College Requirements		6-12
Math Major Requirements		
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 450	Real Analysis I	3
Mathematics Elective	Any 300-400 level	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
STAT 467	Probability and Mathematical Statistics I	3

STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study	1
Statistics Electives	Courses must be at the 400 level and not listed above	9
Related Required Courses		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ECON 202	Principles of Macroeconomics (May satisfy general education category B and G)	3
Electives: Select three courses from the following:		9
CSCI 453	Linear Programming and Network Flows	
CSCI 454	Operations Research	
ECON 341	Intermediate Microeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 410	Econometrics	
ECON 440	Game Theory and Strategy	
ECON 456	History of Economic Thought	
ECON 461	Economic Development	
ECON 465	Labor Economics	
ECON 470	Public Economics	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
FIN 320	Principles of Finance	
FIN 410	Investment Analysis and Management	
FIN 420	Options, Futures, and Other Derivatives	
FIN 450	Advanced Bank Management	
FIN 460	Corporate Finance	

Total Credits**93-99**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/mathematics-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/mathematics-education/#planofstudytext>)

Major Requirements

Major: Mathematics Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in all Teaching Specialty requirement courses and the Professional Education requirement courses.

Code	Title	Credits
Teaching Specialty Requirements		
CSCI 160	Computer Science I	4
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 270	Introduction to Abstract Mathematics	3
MATH 329	Intermediate Linear Algebra	3
MATH 346	Metric Space Topology	3
MATH 374	Special Problems In Mathematics	1

MATH 420	Abstract Algebra I	3
MATH 440	Axiomatic Geometry	3
MATH 450	Real Analysis I	3
MATH 478	History of Mathematics	3
STAT 367	Probability	3
STAT 368	Statistics	3
Mathematics Courses		
Select one 300-400 level MATH prefix course approved by the department. MATH 266 may be used as one of these electives.		3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Math)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		78

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- Students pursuing both Mathematics Education and Mathematics majors are encouraged to take STAT 467/468 in place of STAT 367/368, and choose MATH 421 and 453 or 454 as part of their required Math credits.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Mathematics Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.A.; B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mathematics-education/>)

The Program

Candidates in the mathematics education major are prepared to teach a broad curriculum to a diverse student population in grades 5-12 with creativity and confidence. Mathematics is the language of science and technology, and its history as the oldest and most highly developed discipline making math one of the most exciting and rewarding areas of study for the 21st Century. The mathematics teacher candidate should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses and pass the Core Academic Skills for Educators test or meet minimum scores on the ACR+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced mathematics teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Students will be assigned individual advisors who will work closely with them in program planning. Students are encouraged to meet with their advisor(s) at least once a semester. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for certification to teach mathematics in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education and Standards and Practices Board (ESPB)

Career Opportunities

Mathematics education is also valued by a wide range of employers in government and industry. Mathematics teachers may also choose to pursue graduate degrees after building classroom experience. Those masters and doctoral degrees could lead to post-secondary academic positions and leadership roles in state and national educational organizations.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110 or 120		3 COMM 110	3
MATH 165		4 MATH 129	3
Humanities/Fine Arts		3 MATH 166	4
Science & Technology w/Lab		4 Social/Behavioral Science	3
Wellness		2 Science & Technology	3
		16	16
Second Year			
Fall	Credits	Spring	Credits
CSCI 160		4 EDUC 322	3
EDUC 321		3 Science & Technology (Geoscience, Chemistry, Physics or Biology)	3
MATH 265		4 MATH 329	
MATH 270		3 MATH 440	
STAT 367		3 STAT 368	
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		17	
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 EDUC 481	
EDUC 489		3 Humanities/Fine Arts	
Social/Behavioral Science		3 Upper Division Writing	
MATH 346		3 MATH 266	

MATH 420	3	MATH 478	3
	15		15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 486		3 EDUC 485	1
Elective		3 EDUC 487	9
Elective		3 EDUC 488	3
MATH 374		1	
MATH 450		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
	13		13
Total Credits: 120			

Mechanical Engineering

Department Information

- **Department Location:**
Dolve Hall 111
- **Department Phone:**
701-231-8671
- **Department Web Site:**
www.ndsu.edu/me/ (<http://www.ndsu.edu/me/>)
- **Credential Offered:**
B.S.M.E.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering/>)

The mechanical engineer deals with the broad areas of heat, energy, force and motion, and their effects on a multitude of products. Mechanical engineers may be involved in the design of large industrial machinery, power plants, automobiles and aircraft, robots, biomedical devices and equipment, precision measurement and data acquisition equipment, nanotechnology and new materials, among others. Within these areas, the mechanical engineer enjoys considerable professional flexibility.

The Program

The demand for mechanical engineers with a good technical education has been high for many years. The Department of Mechanical Engineering at North Dakota State University offers an education that enables its graduates to take their places in all facets of the profession. Since inception, the department has graduated approximately 5,000 mechanical engineers who have worked throughout the United States and many other parts of the world. The Bachelor of Science degree in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Curriculum

The standard curriculum allows students flexibility in choosing courses that reflect their interests within the broad areas of mechanical engineering. These include mechanics, materials and nanotechnology, biomedical engineering, alternative energy, fluid dynamics, robotics and more. ME students also have the opportunity to pursue minors in coatings and polymeric materials, biomedical engineering, and robotics, among others, which can enhance their educational experience.

The coatings and polymeric materials minor prepares students for careers that require specialized polymers training, such as the manufacturing of coatings to enhance and preserve vehicles, structures and machines. NDSU's Department of Coatings and Polymeric Materials is internationally renowned. Only five other universities in the U.S. offer programs in coatings and employment opportunities far exceed the number of graduates.

The biomedical engineering minor provides an opportunity for specialized training in one of the highest demand fields today. It prepares graduates to be able to contribute to the global demand for medical technologies and innovations.

The robotics minor is designed to give students the skills needed to design and develop robotic devices, and use those devices to solve real-life problems. The minor provides depth of content in subjects including microprocessor programming, sensors and instrumentation, actuation systems, control principles, and robot manipulation. Graduates from this program may work in a wide range of industries including automotive, aerospace, drone manufacturers, packaging systems, precision agriculture, energy and mining, among others.

Undergraduate students who excel in our program may consider advancing towards a master's degree by applying for our Accelerated Master's Program. This option gives the student a jump-start on the Master of Science curriculum requirements while they finish their Bachelor of Science degree by allowing 6 credits of coursework to be applied to both degrees.

The Faculty and Facilities

The Department of Mechanical Engineering is housed in Dolve Hall, which is part of an eight-building engineering complex. Laboratories and classrooms are well-suited and equipped for teaching and research. Students have access to PC computer clusters and facilities located in Dolve Hall to assist them in their laboratory and class work. The faculty offers a variety of expertise and extensive experience in teaching and research.

High School Preparation

To enroll in the mechanical engineering curriculum for the freshman year, students should have two years of high school algebra and one year of trigonometry, as well as a year in chemistry and physics. Students without these courses may take them at NDSU to better prepare academically for a specific engineering curriculum.

Selective Admission

The Department of Mechanical Engineering has minimum admission requirements for new freshmen and transfer students.

New freshmen must have a minimum high school grade point average (GPA) of 3.0 or have a minimum math ACT of 26 or SAT math sub score of 590.

Transfer students must have a minimum cumulative grade point average (GPA) of 2.7.

All new students who meet mechanical engineering admission requirements are initially admitted to the basic program in mechanical engineering. After completing 50 credits of specified courses with a minimum GPA of 2.5, minimum engineering GPA of 2.7 and no grade below a C, students are eligible for admission to the professional program. The engineering GPA is calculated based on specific core engineering courses.

Students who do not meet the minimum admission criteria will be placed in mechanical engineering under the advisement of a general engineering advisor until minimum admission criteria have been met.

Career Opportunities

Recent graduates have found employment in companies throughout the United States. The average starting salary is approximately \$62,000. A sampling of companies hiring NDSU graduates includes: 3M, American Crystal Sugar, Angus Palm, Applied Engineering, Arctic Cat Inc., Black and Veatch, Bobcat, Boeing, Cargill, Caterpillar, Daktronics, Horsch Anderson, Integrity Windows, John Deere, Montana Dakota Utilities, Parker-Hannifin, Puget Sound Naval Shipyard and Xcel Energy.

Cooperative Education Program

Students in mechanical engineering are encouraged to participate in the Cooperative Education Program at NDSU. It consists of one or more four-month sessions of work experience after completion of the sophomore year. This optional industry experience provides students with hands-on opportunities not available in the classroom, and makes students more marketable to employers after graduation. Students who register for co-op credits and successfully complete the program may apply those credits towards graduation as technical elective coursework.

Plan of Study

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
MATH 165		4 MATH 166	4
ENGL 110		3 ENGL 120	3
CHEM 121		3 CHEM 122	3
ME 111		2 ME 212	3
Humanities & Fine Arts Gen Ed		3 ME 221	3

Wellness Gen Ed		2
15		18
Sophomore		
Fall	Credits	Spring Credits
MATH 129		3 MATH 266 3
MATH 259		3 COMM 110 3
IME 330		3 PHYS 252 & 252L 5
ME 222		3 ME 213 3
ME 223		3 ME 351 3
Humanities & Fine Arts Gen Ed		3
18		17
Junior		
Fall	Credits	Spring Credits
ECE 301		3 ECE 306 1
ENGR 402		1 ME 361 3
ENGL 321		3 ME 442 3
ME 331		4 ME 454 3
ME 352		3 Technical Elective 3
Technical Elective		3 Social & Behavioral Science Gen Ed 3
17		16
Senior		
Fall	Credits	Spring Credits
ME 421		3 ME 412 3
ME 443		3 ME 462 3
ME 457		3 Technical Elective 3
ME 461		3 Technical Elective 3
Technical Elective		3 Social & Behavioral Science Gen Ed 3
15		15

Total Credits: 131

Degree Notes:

- Total degree credits required to graduate: 129
- Total credits listed above may exceed minimum credit requirements for graduation.

Mechanical Engineering

Department Information

- **Department Location:**
Dolve Hall
- **Department Phone:**
701-231-8671
- **Department Web Site:**
www.ndsu.edu/me/ (<http://www.ndsu.edu/me/>)
- **Credential Offered:**
B.S.M.E.
- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/mechanical-engineering/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/mechanical-engineering/#planofstudytext>)

Major Requirements

Major: Mechanical Engineering

Degree Type: B.S.M.E.

Minimum Degree Credits to Graduate: 129

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major REquirements

Code	Title	Credits
Mechanical Engineering Requirements:		
ME 111	Introduction to Mechanical Engineering *	2
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4

ME 351	Thermodynamics I	3
ME 352	Fluid Dynamics	3
ME 361	Product Design and Development	3
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
CHEM 121	General Chemistry I (May satisfy general education category S)	3
CHEM 122	General Chemistry II (May satisfy general education category S)	3
ECE 301	Electrical Engineering I	3
ECE 306	Electrical Engineering Lab I	1
ENGL 321	Writing in the Technical Professions (May satisfy general education category C)	3
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 330	Manufacturing Processes	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
Technical Electives: Select 15 credits from the following:		15
ME 332	Engineering Materials II	
ME 353	Thermodynamics II	
ME 435 or IME 635	Plastics and Injection Molding Manufacturing Plastics and Injection Molding Manufacturing	
ME 436	Biopolymers and Biocomposites	
ME 437	Engineering Ceramics	
ME 468	Introduction to Biomechanics	
ME 470	Renewable Energy Technology	
ME 471	Experimental Stress Analysis	
ME 472	Fatigue and Fracture of Metals	
ME 473	Engineering with Polymeric Materials	
ME 474	Mechanics of Composite Materials	
ME 475	Automatic Controls	
ME 476	Mechatronics	
ME 477	ME Finite Element Analysis	
ME 478	Advanced Flow Diagnostics	
ME 479 or ABEN 479	Fluid Power Systems Design Fluid Power Systems Design	
ME 480	Biofluid Mechanics	
ME 481	Fundamentals of Energy Conversion	
ME 482	Fuel Cell Science and Engineering	
ME 483	Introduction to Computational Fluid Dynamics	
ME 484	Gas Turbines	
ME 485	Heating, Ventilation and Air Conditioning	
ME 486 or CE 686	Nanotechnology and Nanomaterials Nanotechnology and Nanomaterials	

ME 487	Internal Combustion Engines
ME 488	Introduction to Aerodynamics
ME 489	Vehicle Dynamics
Approved technical electives from other departments - no more than 3 courses from the following:	
ABEN 456	Biobased Energy
CPM 473	Polymer Synthesis
CPM 474	Applied Polymer Science
CPM 475	Coatings' Materials Science
CPM 486	Corrosion and Materials
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems
ECE 485	Biomedical Engineering
ECE 487	Cardiovascular Engineering
ECE 488	Cardiovascular Engineering II
ENGR 310	Entrepreneurship for Engineers and Scientists
ENGR 321	Introduction to Robotics
ENGR 379	Study Tour Abroad
IME 430	Process Engineering
IME 431	Production Engineering
IME 432	Composite Materials Manufacturing
IME 440	Engineering Economy
IME 450	Systems Engineering and Management
IME 460	Evaluation of Engineering Data
IME 485	Industrial and Manufacturing Facility Design
PHYS 350	Modern Physics
PHYS 355	Classical Mechanics
PHYS 361	Electromagnetic Theory
PHYS 485	Quantum Mechanics I

Total Credits**108**

* Students who transfer any 30 or more credits into the program are not required to take ME 111.

Degree Requirements and Notes

- No grades less than 'C' will be accepted to fulfill a degree requirement.
- No more than nine credits of approved technical electives may be taken outside the ME department.
- Admission to the Mechanical Engineering Professional program requires a minimum 2.70 engineering GPA and a minimum 2.50 cumulative GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

Mechanical Engineering and Physics

Department Information

- **Department Location:**
Dolve Hall 111
- **Department Phone:**
701-231-8671
- **Department Web Site:**
www.ndsu.edu/me/ (<http://www.ndsu.edu/me/>)
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering-physics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/mechanical-engineering-physics/>)

Engineering and physics have always been closely related disciplines. Mechanical engineering combines engineering physics and applied mathematics with materials science to design mechanical systems. It requires knowledge of core areas of physics, such as mechanics, thermodynamics, theory of elasticity, electricity and magnetism; modern materials science requires understanding of quantum physics. Therefore, the demand is growing for engineers with multidisciplinary training that includes both fundamental knowledge of physics and practical problem-solving skills. The Mechanical Engineering and Physics double major program is designed to allow students to complete the core requirements of both majors

in a four-year degree. Graduates of the program will have a unique background qualifying them to pursue careers in industry, government, and higher education, or to pursue graduate studies in engineering, physics or other technical fields.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
MATH 165		4 MATH 166	4
ENGL 110 (or placement)		3 ENGL 120	3
CHEM 121		3 CHEM 122	3
ME 111		2 ME 212	3
PHYS 171		1 ME 221	3
Humanities & Fine Arts Gen Ed		3 Wellness General Education	2
		16	18
Sophomore			
Fall	Credits	Spring	Credits
MATH 129		3 MATH 266	3
MATH 265		4 COMM 110	3
IME 330		3 PHYS 252	4
ME 222		3 PHYS 252L	1
ME 223		3 ME 213	3
		ME 351	3
		16	17
Junior			
Fall	Credits	Spring	Credits
ENGL 321		3 ECE 301	3
ENGR 402		1 ME 361	3
ME 331		4 ME 442	3
ME 352		3 ME 454	3
PHYS 355 (ME Tech Elective)		3 PHYS 350 (ME Tech Elective)	3
PHYS 411		3 PHYS 361 (ME Tech Elective)	3
PHYS 411L		1	
		18	18
Senior			
Fall	Credits	Spring	Credits
ECE 306		1 ME 412	3
ME 443		3 ME 462	3
ME 457		3 ME 421	3
ME 461		3 Physics Elective	3
PHYS 485		3 Social & Behavioral Science Gen Ed	3
Social & Behavioral Science Gen Ed		3 Humanities and Fine Arts Gen Ed	3
		16	18
Total Credits: 137			

Mechanical Engineering and Physics

Department Information

- **Department Location:**
Dolve Hall 111
- **Department Phone:**
701-231-8671
- **Department Web Site:**
www.ndsu.edu/me/ (<http://www.ndsu.edu/me/>)
- **Credential Offered:**
B.S.M.E
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/mechanical-engineering-physics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/mechanical-engineering-physics/>)

Major Requirements

Major: Mechanical Engineering & Physics

Degree Type: B.S.M.E.

Minimum Degree Credits to Graduate: 129

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Code	Title	Credits
CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
ECE 301	Electrical Engineering I	3
ECE 306	Electrical Engineering Lab I	1
ENGL 321	Writing in the Technical Professions	3
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 330	Manufacturing Processes	3
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
ME 111	Introduction to Mechanical Engineering **	2
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 213	Modeling of Engineering Systems	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 223	Mechanics of Materials	3
ME 331	Materials Science and Engineering	4
ME 352	Fluid Dynamics	3
ME 351	Thermodynamics I	3
ME 361	Product Design and Development	3
ME 412	Engineering Measurements	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 443	Machine Design II	3
ME 454	Heat and Mass Transfer	3
ME 457	Thermal Systems Laboratory	3
ME 461	Design Project I	3
ME 462	Design Project II	3
PHYS 171	Introductory Projects in Physics	1
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics *	3
PHYS 355	Classical Mechanics *	3
PHYS 361	Electromagnetic Theory *	3
PHYS 411	Optics for Scientists & Engineers	3
PHYS 411L	Optics for Scientists and Engineers Lab	1
PHYS 485	Quantum Mechanics I	3
PHYS Elective		3
Total Credits		114

* Mechanical engineering technical electives

** Students who transfer any 30 or more credits into the program are not required to take ME 111.

Degree Notes:

- No grade less than 'C' is accepted to fulfill any of the degree requirements.
- Admission to the dual major requires a minimum 2.70 GPA
- A 2.50 cumulative GPA is required for graduation.

Medical Laboratory Science

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/medical-laboratory-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/medical-laboratory-science/>)

Medical laboratory scientists use analytical procedures and complex instruments to perform tests on blood and body fluids that assist physicians in patient diagnosis and treatment, disease monitoring and prevention. Because the tests performed are so vital in medical treatment, the medical laboratory scientist must know how to perform these tests with scientific precision and accuracy, but also be well educated in the underlying scientific principles and clinical significance of the results.

Background Information

Laboratory work plays a vital role in the daily routine of the medical laboratory scientist and, while usually not having direct contact with patients, the MLS enjoys being a vital member of the health care team. Clinical chemistry, hematology, microbiology, urinalysis, immunohematology and immunology are the principle areas of practice in the medical laboratory. In addition to laboratory testing and analysis, a medical laboratory scientist may also monitor test quality, supervise personnel, conduct research and develop new tests and methodologies.

Career Opportunities

Certified medical laboratory scientists may readily find employment throughout the country in hospitals, medical and diagnostic laboratories, and other healthcare services. According to the U.S. Department of Labor Bureau of Labor Statistics (<https://www.bls.gov/ooh/healthcare/medical-and-clinical-laboratory-technologists-and-technicians.htm>), employment of clinical laboratory workers is expected to grow faster than average for all occupations through 2026. This increase is attributed to growth in the aging population leading to a greater need to diagnose medical conditions through laboratory procedures, as well as, prenatal testing for various genetic conditions which has become increasingly common. Mean annual wages for medical laboratory scientists/technologists was \$53,120 in 2019 (Clinical Laboratory Technologists and Technicians : Occupational Outlook Handbook : U.S. Bureau of Labor Statistics (bls.gov) (<https://www.bls.gov/ooh/healthcare/clinical-laboratory-technologists-and-technicians.htm#tab-5>)).

The Program

North Dakota State University's Bachelor of Science degree, major in medical laboratory science, includes three years of academic courses on campus followed by an 11 to 12 month full-time professional-level internship in an affiliated hospital-based school of medical laboratory science. Graduates are eligible to take a national certification exam administered by the American Society for Clinical Pathology Board of Certification (<https://www.ascp.org/content/Board-of-Certification/>). NDSU graduates have enjoyed excellent employment opportunities and pass rates on the ASCP BOC exam. To remain certified, medical laboratory scientists must earn continuing education credits.

Students interested in pursuing medical laboratory science should have an interest and aptitude in the sciences, particularly chemistry and biology. College courses include college algebra, biological sciences, microbiology, general, organic and biochemistry and statistics, along with general education courses. Transfer students need to successfully complete a minimum of 20 resident credits at NDSU prior to beginning an internship. The full-time internship consists of classroom and clinical bench instruction in clinical chemistry, hematology, immunohematology, microscopy/urinalysis, microbiology, serology, phlebotomy, education, management, and research methods.

Internship Admission

Internship application occurs annually in the fall. Pre-MLS students who will have completed all courses on campus by start of the internship and meet grade and grade point average (GPA) requirements may be eligible to apply for the professional-level internship. This internship occurs onsite within an affiliated hospital-based MLS program. NDSU maintains affiliation with six medical laboratory science programs. These include: Sanford Medical Center (Fargo, ND), Mercy College of Health Sciences (Des Moines, IA), Methodist Hospital (Omaha, NE), St. Luke's College (Sioux City, IA), St. Luke's Hospital (Cedar Rapids, IA), and Colorado Center for Medical Laboratory Science (Aurora, CO). All affiliated programs are accredited by the National Accrediting Agency for Clinical Laboratory Science. (<https://naacsls.org/Students.aspx>)

Internship admission is selective. Admission criteria are established by each hospital program and generally includes the student's cumulative and science GPA (a minimum of 2.50-3.00 is required and varies by hospital program), courses completed, related experience, references and an interview. In addition, students must comply with criminal background and student conduct requirements. In order to participate in an MLS internship, students

must be able to comply with program-designated essential functions, or request reasonable accommodations to meet these essential functions. Requirements include a sound intellect, good motor skills, eye-hand coordination and dexterity, effective communication skills, visual acuity to perform macroscopic and microscopic analyses, or read procedures and graphs, and behavioral skills such as organization, time management and good judgment, even in emergency situations.

It is highly recommended that students interested in the MLS major meet with a medical laboratory science advisor to discuss degree and major requirements, internship admission, and create an individualized plan of study at least one year prior to their anticipated internship application. Information about the profession, curriculum, internship, and advising contacts are available from the NDSU Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences/>).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 150		3 CHEM 122	3
BIOL 150L		1 CHEM 122L	1
CHEM 121		3 COMM 110	3
CHEM 121L		1 CSCI 114	3
CHP 190		2 ENGL 120*	3
MATH 103		3 Humanities & Fine Arts (A) & Global Perspective (G)	3
ENGL 110*		3	
	16		16
Second Year			
Fall	Credits	Spring	Credits
BIOL 220		3 BIOL 221	3
BIOL 220L		1 BIOL 221L	1
CHEM 341**		3 CHEM 342**	3
CHEM 341L**		1 MICR 460	3
MLS 200		1 MICR 460L	2
MICR 350		3 STAT 330	3
MICR 350L		2	
Wellness (W)		2	
	16		15
Third Year			
Fall	Credits	Spring	Credits
BIOC 460		3 Humanities & Fine Arts (A)	3
BIOC 460L		1 MLS 435	2
BIOL 315		3 MICR 463	2
BIOL 315L		1 Social & Behavioral Sciences (B) & Cultural Diversity (D)	3
MICR 470		3 Upper Division Writing (C; 300-400 level)	3
MICR 471		2	
Social & Behavioral Sciences (B)		3	
	16		13

Fourth Year					
Fall	Credits	Spring	Credits	Summer	Credits
MLS 496 ^{***}		12 MLS 496 ^{***}		12 MLS 496 ^{***}	6
		12		12	6

Total Credits: 122

- * All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.
- ** Students have the option to complete Chem 240, Bioc 460, Bioc 460L, & Bioc 461 in place of Chem 341, Chem 341L, Chem 342, Bioc 460 & Bioc 460L.
- *** Credits earned in an affiliated, NAACLS accredited hospital program; one year in length, including one summer session.

Medical Laboratory Science

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/medical-laboratory-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/medical-laboratory-science/#planofstudytext>)

Major Requirements

Medical Laboratory Science Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10

Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Medical Laboratory Science Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
MLS 200	Introduction to Medical Laboratory Science	1
MLS 435	Hematology	2
MLS 496	Field Exp/Internship	30
Professional education (internship) within an accredited affiliated school of medical laboratory science includes the capstone experience.		
Related Courses Required:		
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151	General Biology II	3
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy a general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
CSCI 114 or TL 116	Computer Applications (May satisfy a general education category S) Business Software Applications	3
MATH 103	College Algebra (or higher level; excluding MATH 104)	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 463	Clinical Parasitology	2
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one group of the following:		6-7
Group One:		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
Group Two:		

CHEM 240

Survey of Organic Chemistry

BIOC 461

Foundations of Biochemistry and Molecular Biology II

Total Credits**98-99**

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your MLS advisor for more information.

Microbiology

Department Information

- **Department Location:**
Van Es Hall
- **Department Phone:**
701-231-7512
- **Department Web Site:**
www.ndsu.edu/microbiology/ (<http://www.ndsu.edu/microbiology/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/microbiology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/microbiology/#planofstudytext>)

Major Requirements

Major: Microbiology

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6

Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required for the microbiology core and elective requirements.

Code	Title	Credits
Required Courses for Microbiology Major		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 352 & 352L	General Microbiology II and General Microbiology Lab II	5
MICR 452	Microbial Ecology	3
MICR 470	Basic Immunology	3
MICR 475	Virology	3
MICR 480	Microbial Physiology	3
MICR 482	Microbial Genetics	3
MICR 485 or HON 491	Capstone Experience in Microbiology - Experimental Design (HON 491 can substitute) Seminar	1
MICR 486 or HON 489	Capstone Experience in Microbiology - Research Project (HON 489 can substitute) Senior Thesis	2
Microbiology Electives - Must include at least one laboratory course		12
No more than 3 credits may come from courses numbered 371-399 or 491-499 to fulfill this requirement.		
MICR 379 or MICR 492	Study Tour Abroad Study Abroad	
MICR 394	Individual Study	
MICR 453	Food Microbiology	
MICR 460	Pathogenic Microbiology	
MICR 463	Clinical Parasitology	
MICR 481	Microbial Genomics with Computational Laboratory	
MICR 491	Seminar	
MICR 493	Undergraduate Research	
MICR 494	Individual Study	
MICR 496	Field Experience	
BIOC 483	Cellular Signal Transduction Processes and Metabolic Regulations	
BIOC 487	Molecular Biology of Gene Expression	
BIOL 359	Evolution	
BIOL 370	Cell Biology	
MLS 435	Hematology	
PH 474	Epidemiology	
PLSC 431	Intermediate Genetics	
SOIL 351	Soil Ecology	
Laboratory Courses - Must include at least one from the following as part of the 12 credits of microbiology electives:		
BIOC 474	Methods of Recombinant DNA Technology	
MICR 445	Animal Cell Culture Techniques	

MICR 460L	Pathogenic Microbiology Laboratory	
MICR 471	Immunology and Serology Laboratory	
Related Requirements for the Microbiology Major		
MICR 189	Skills for Academic Success ¹	1
PHIL 111	Professional Responsibility and Ethics	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory (May satisfy general education category S)	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory (or higher (May satisfy general education category S)	4
PLSC 315 & 315L	Genetics and Genetics Laboratory (May satisfy general education category S)	4
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Select one of the following or higher level math:		3-4
MATH 105	Trigonometry	
MATH 107	Precalculus	
MATH 146	Applied Calculus I	
Total Credits		91

¹ MICR189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MICR189.

Degree Requirements and Notes

- A cumulative 2.50 GPA is required for graduation.

Minor Requirements

Minor: Microbiology

Required Credits: 16

Code	Title	Credits
Required Courses		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Elective Courses: Select 11 credits from the following:		11
No more than 3 credits may come from courses numbered 491-499 to fulfill this requirement.		
MICR 352	General Microbiology II	
MICR 379	Study Tour Abroad	
MICR 445	Animal Cell Culture Techniques	
MICR 452	Microbial Ecology	
MICR 453	Food Microbiology	
MICR 460	Pathogenic Microbiology	

or MICR 450	Infectious Disease Pathogenesis
MICR 460L	Pathogenic Microbiology Laboratory
or MICR 450L	Infectious Disease Pathogenesis Laboratory
MICR 463	Clinical Parasitology
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 472	Clinical Immunology
MICR 474	Epidemiology (see SAFE)
MICR 475	Virology
MICR 480	Microbial Physiology
MICR 481	Microbial Genomics with Computational Laboratory
MICR 482	Microbial Genetics
MICR 491	Seminar
MICR 494	Individual Study
MICR 496	Field Experience
MICR 499	Special Topics

Total Credits**16**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a 2.50 minimum GPA for the minor with a grade of 'C' or better in the courses used to satisfy the minor requirements.

Microbiology

Department Information

- **Department Location:**
Van Es Hall
- **Department Phone:**
701-231-7512
- **Department Web Site:**
www.ndsu.edu/microbiology/ (<http://www.ndsu.edu/microbiology/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/microbiology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/microbiology/>)

Microbiology is a fundamental biological science concerned with bacteria, viruses and other microbes. Some of the most important scientific discoveries have been made by microbiologists. Since 1910, approximately one-third of the Nobel Prizes in medicine and physiology have been awarded to microbiologists. The discipline covers a wide spectrum of specialized interest areas that show how microbes affect human and animal health, agriculture, our environment, food technology and safety, and the biotechnology industry. Microbiology prepares students for a wide range of important career opportunities.

In recent years, the field of microbiology has had a major impact upon virtually all other scientific disciplines. For this reason, students who choose to major in microbiology often minor in biotechnology, chemistry or food safety. Students who choose to major in other fields may find it advantageous to minor in microbiology.

High School Preparation

Students will find courses in science and mathematics, such as algebra, biology, physics, and chemistry, to be very helpful in preparing for a major in microbiology. Transfer students are strongly advised to take transferable intro biology and chemistry courses in preparation for upper-level science courses at NDSU

The Curriculum

During the first year, students in microbiology take basic college courses in English, chemistry, biology, and mathematics. The curriculum over the next three years includes advanced courses in microbiology and the life sciences. These courses include microbial physiology, microbial genetics, virology, immunology, and microbial ecology. Students majoring in microbiology can enhance their understanding of applied microbiology and infectious

disease by taking courses such as pathogenic microbiology, clinical parasitology, food microbiology, and microbial genomics. Students may choose to minor in programs such as biotechnology, public health, and food safety.

Pathways to success

The department of Microbiological Sciences offers several "Pathways to Success". Depending on your career goals, you may find one of these pathways will enhance your education to meet that goal. We currently have Pathways to Success in: General Micro degree, Pre-Health Careers, Pre-Veterinary careers, Honors, and Master of Public Health (3+2 option).

The Faculty and Facilities

The teaching faculty offer expertise and experience in nearly all areas of microbiology. Additionally, faculty are active researchers and devoted research mentors. Our undergraduates frequently have opportunities to perform cutting edge research in nationally-funded laboratories.

The Department of Microbiological Sciences, located in Van Es Hall, has well-equipped teaching and research laboratories. Several courses are taught in the dedicated STEM education building, A. Glenn Hill Center.

Qualified upper-class students majoring in microbiology may pursue individualized study and research under the supervision of one of the faculty members.

Post Graduate Opportunities

Pre-Professional. The microbiology major is excellent preparation for professional school including medical, veterinary, dental, optometry, and physician assistant programs.

Graduate School. The microbiology major emphasizes experiential learning in coursework and research laboratories that provides the foundation to be successful in graduate school.

Career Opportunities

Graduates may seek employment in the health sciences, biomedical industries, biotechnology, agricultural biosystems, food industries, pharmaceutical industries and government agencies. In these careers, graduates may identify new emerging diseases; develop diagnostic tests, new medicines and vaccines; work in departments of public health or hospital laboratories to ensure a safe food supply; or work in academic or private research laboratories. Microbiologists work in government agencies such as the National Institutes of Health and the Environmental Protection Agency. Many microbiologists are teachers and professors.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
MICR 189		1 BIOL 151	3
CHEM 121		3 BIOL 151L	1
CHEM 121L		1 CHEM 122	3
BIOL 150		3 CHEM 122L	1
BIOL 150L		1 ENGL 120	3
ENGL 110		3 Gen Ed Social and Behavioral/ Global Perspectives	3
MATH 105 ^{MATH 107 or MATH 146 also acceptable}		3 Gen Ed Wellness	2
			15
			16
Second Year			
Fall	Credits	Spring	Credits
COMM 110		3 MICR 352	3
CHEM 341		3 MICR 352L	2
CHEM 341L		1 PLSC 315	3
STAT 330		3 PLSC 315L	1

MICR 350		3 CHEM 342	3
MICR 350L		2 MICR 452	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
BIOC 460		3 BIOC 461	3
PHYS 211		3 PHYS 212	3
PHYS 211L		1 PHYS 212L	1
MICR 470		3 MICR 480	3
PHIL 111		3 Microbiology Elective	3
		Gen Ed Humanities and Fine Arts/ Cultural Diversity	3
		13	16
Fourth Year			
Fall	Credits	Spring	Credits
ENGL 324 or 325		3 MICR 486 or HON 489	2
MICR 482		3 Microbiology Elective	3
MICR 475		3 Microbiology Elective	3
MICR 485 or HON 491		1 Free Elective	6
Microbiology Elective		3	
Gen Ed Social & Behavioral Sciences		3	
		16	14

Total Credits: 120

Military Science

Department Information

- **Department Location:**
Bentson Bunker Fieldhouse 103
- **Department Phone:**
701-231-7575
- **Department Web Site:**
www.ndsuarmyrotc.com (<http://www.ndsuarmyrotc.com>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/military-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/military-science/>)

The North Dakota State University Army Reserve Officers' Training Corps (ROTC) program provides college-trained officers for the Army, Army Reserve and Army National Guard. Army ROTC enhances a student's education. It provides unique educational opportunities by combining leadership and management theory with actual hands-on experience. Army ROTC helps the student to develop leadership skills to include self-discipline, physical stamina and advanced life skills – the qualities basic to success in any worthwhile career.

Career Opportunities

Students who complete the Army ROTC program may pursue careers as officers in the Army National Guard, Army Reserve, or the active Army. Students selected for active duty will receive a generous salary in excess of \$55,000 per year, with housing and medical benefits, and will have opportunities to travel to assignments throughout the world. Students selected for reserve components receive more than \$10,000 per year and amazing health insurance for attending for drills and annual training while pursuing their civilian careers. More importantly, the professional experience in management and leadership will enhance the student's marketability in any profession, civilian or military.

Program Description

The Army ROTC program consists of a two-year Basic Course and a two-year Advanced Course. The Basic Course is normally taken during the freshman and sophomore years. During these two years there is no military obligation for non-contracted cadets, and a student may withdraw at any time. Students who have taken Junior ROTC, have active duty military experience, or are currently a member of a Reserve/National Guard unit may receive placement credit for the Basic Course.

Military Science

Department Information

- **Department Location:**
Bentson/Bunker Field House
- **Department Phone:**
701-231-7575
- **Department Web Site:**
www.ndsuarmyrotc.com (<http://www.ndsuarmyrotc.com>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/military-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/military-science/>)

Minor Requirements

Minor: Military Science

Required Credits: 25

Code	Title	Credits
Required Courses		
MS 101	Foundations of Officership	1
MS 102	Basic Leadership	1
MS 201	Individual Leadership Studies	2
MS 202	Leadership and Teamwork	2
MS 301	Leadership and Problem Solving	3
MS 302	Leadership and Ethics	3
MS 310	Leadership Laboratory	1
MS 320	Leadership Laboratory	1
MS 401	Leadership and Management	3
MS 402	Officership	3
MS 410	Leadership Laboratory	1
MS 420	Leadership Laboratory	1
Select one of the following history Courses:		3
NDSU Courses:		
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	
HIST 422	American Civil War and Reconstruction	
HIST 424	U.S. History 1917-1960	
Concordia Courses:		
HIST 111	United States in Perspective to 1865 (Concordia College)	
HIST 112	United States in Perspective since 1865 (Concordia College)	
HIST 314	U.S. Foreign Policy (3)	
HIST 338	Hitler's Germany (3)	
HIST 365	Global Issues (3)	
MSUM Courses:		
HIST 121	U.S. History I (3)	

Minor Requirements and Notes

- This minor must be officially declared: see Office of Registration and Records.
- A minimum of 8 credits must be taken at NDSU.
- The following classes may be substituted for required classes after consultation with Military Science Dept Advisor - MS 110 Army ROTC Physical Fitness and MS 194 Individual Study.

Music

Department Information

- **Department Location:**
Reineke Fine Arts Center
- **Department Phone:**
701-231-7932
- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/music/ (<http://www.ndsu.edu/performingarts/music/>)
- **Credential Offered:**
B.A.; B.S.; B.Mus.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/music/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/music/>)

North Dakota State University offers the most comprehensive degree programs for music majors in the region and provides outstanding musical opportunities for all NDSU students.

The Program

The NDSU Challey School of Music features excellent students, faculty, staff and facilities. The program has been continuously accredited by the National Association of Schools of Music since 1970 and has a strong tradition of excellence in ensembles dating back to 1904. Faculty and staff members are committed to providing outstanding musical opportunities for all NDSU students—whether they aspire to be professional musicians or only wish to take advantage of NDSU's many musical opportunities.

The Faculty

NDSU music faculty members have international credentials in performance, music education and academic studies. All full time faculty members have doctorates in music; adjunct faculty members and graduate students provide additional instruction to achieve a well-balanced program.

The Degrees

NDSU's Challey School of Music offers the largest variety of degree programs in the region, from liberal arts degrees with emphases in music to professional music degrees at the bachelor's, master's and doctoral levels.

Undergraduate music majors take courses in music theory, music literature, music history, and conducting; receive private lessons on a selected instrument and/or in voice; and participate in a major ensemble. Other courses are selected within chosen areas of concentration. In all programs, applied instrumental or vocal studies develop musicianship and performance ability. Students are accepted for private lessons depending upon demonstrated musical ability and available staff resources.

The Bachelor of Arts (B.A.) and Bachelor of Science (B.S.) in music are liberal arts degrees with an emphasis in music. In addition to a general education core and the music concentration, students complete either a two-year competency in a foreign language or a complementary minor degree. Students take a minimum of 15 credits in music electives.

The Bachelor of Music (B.Mus.) with an option in music education leads to K-12 vocal and instrumental certification for North Dakota public schools, and satisfies basic agreements in the primary area for Minnesota certifications.

The B.Mus. in performance leads to professional performing careers or preparation for graduate school. Students select a concentration in instrumental, vocal or piano studies.

NDSU also offers the Master of Music and the Doctor of Musical Arts degrees.

Further, the School of Music offers a minor in music consisting of 20 credit hours of music classes, including applied study, ensembles, academic studies and electives.

Career Opportunities

Degree programs in music education prepare students for opportunities as elementary, high school or college teachers, while performance degree students usually seek performing or conducting careers. Graduates often choose careers as professional teachers, instrumentalists or vocalists, and conductors. There are also more general opportunities in various music industries.

Music Performance Opportunities

All music ensembles are open to any NDSU student without regard to major and provide course credit (generally one semester hour for each group listed). Ensembles are some of the most rewarding experiences in college, and all students with musical interests are encouraged to participate.

The **Gold Star Marching Band** plays for all home NDSU football games and marches in special events during fall semester. The group rehearses three days per week and is open to all students.

The **Concert Choir** meets five days per week, both fall and spring semesters. Open by audition, the group tours regionally or nationally on an annual basis and to European countries every three years.

The **NDSU Wind Symphony** is NDSU's large concert ensemble for wind and percussion instruments. Members meet both fall and spring semesters and tour annually. Open by audition.

A smaller ensemble, **Madrigal Singers**, performs repertoire from the renaissance through contemporary periods. This auditioned group meets three days per week fall and spring semesters and produces the annual Madrigal Dinners in December and tours with the Concert Choir. Members are auditioned from Concert Choir.

The **Jazz Ensembles** are two jazz big bands, generally of about 20 musicians each. Ensembles meet two times per week fall and spring semesters. Open by audition.

In **Opera Theatre**, opera scenes are rehearsed and produced each semester. This auditioned group meets three times per week. The School of Music traditionally produces a fully staged opera or musical every year in the spring semester.

A second concert band, **University Band** is open to all students by audition for section placement. University Band meets three times per week and has two concerts each semester. The **University Symphony Orchestra** performs 2 concerts each semester.

The **University Chamber Singers** is an auditioned mixed choir of students from many different majors and disciplines. They perform a wide variety of music and sing in at least two concerts each semester. There is an audition for this ensemble.

Cantemus performs SA literature from all periods and meets two times per week. **NDSU Statesmen** performs TB literature from all periods and meets two times per week. Both choirs perform at least two concerts each semester. There is no audition for these ensembles.

Chamber ensembles include the percussion ensemble, brass ensemble, brass chamber ensembles, woodwind chamber ensembles (including flute quartets, clarinet ensembles, saxophone quartets and mixed woodwinds), vocal chamber ensembles, piano chamber ensembles and jazz combos.

The Curricula

Music degree programs vary because of the numerous options available. All music degrees, however, feature a general core of music classes that includes applied lessons, ensembles, supportive music courses, academic music studies and electives. Curriculum guides are available online and from the School of Music.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
MUSC 130		3 MUSC 103 counts as a Humanities and Fine Arts Gen Ed	3
MUSC 132		1 MUSC 131	3
MUSC 189		1 MUSC 133	1
MUSC 1XX Applied Lessons		1 MUSC 180	0
MUSC 180		0 MUSC 1XX Applied Study	1

ENGL 110	3	ENGL 120	3
COMM 110	3	Quantitative Reasoning Gen Ed course	3
Science & Technology Gen Ed course	3	Minor requirement course	3-0

15

17-14

Sophomore			
Fall	Credits	Spring	Credits
MUSC 180		0 MUSC 180 Performance Attendance	0
MUSC 230		3 MUSC 2XX Applied Study	1
MUSC 232		1 MUSC 231	3
MUSC 2XX Applied Study		1 MUSC 233	1
MUSC 385		3 MUSC 3XX Major Ensemble	1
Social & Behavioral Science Gen Ed course		3 MUSC 3XX Music Elective	3
MUSC 3XX Major Ensemble		1 Social & Behavioral Sciences/ Cultural Diversity Gen Ed course	3
Course for declared minor		3 Science & Technology Gen Ed course	3
		Science Lab	1

15

16

Junior			
Fall	Credits	Spring	Credits
MUSC 180 Performance Attendance		0 MUSC 341	3
MUSC 340 ^{counts as a Humanities and}		3 MUSC 3XX Applied Study	1
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 3XX Applied Study		1 Minor requirement or Language II	3-4
College Requirement course		3 College Requirement course	3
Minor requirement or Language I		3-4 Music Elective course	3
Upper Division English course		3 Music Elective course	3

14-15

17-18

Senior			
Fall	Credits	Spring	Credits
MUSC 3XX Major Ensemble		1 Capstone Experience	1
MUSC 3XX Music Elective		3 MUSC 3XX Major Ensemble	1
College Requirement course		3 Music Elective	3
Minor requirement or Language III		3-4 Music Elective	3
Science & Technology/Global Perspectives Gen Ed course		3 College Requirement	3
Wellness Gen Ed course		2 Minor requirement or Language IV	3-4

15-16

14-15

Total Credits: 123-124

Degree Requirements and Notes

- Music majors may not declare a music minor.
- A grade of 'C' or better is required in all MUSC prefix courses.

- Arts, Humanities and Social Sciences College Requirements: An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for all Bachelor of Science and Bachelor of Arts degree programs of study, except the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree
- Bachelor of Science (B.S) Degree - The completion of a minor program of study, a second major, or a second degree is required.
- Bachelor of Arts (B.A.) Degree - Second year language proficiency at college level required.
- MUSC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.
- B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 (<https://bulletin.ndsu.edu/search/?P=MUSC%20380>) Recital, MUSC 480 (<https://bulletin.ndsu.edu/search/?P=MUSC%20480>) Recital, or MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study. The MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study registration is approved by the music faculty and supervised by the adviser. Possibilities include:
 - Half (MUSC 380 (<https://bulletin.ndsu.edu/search/?P=MUSC%20380>) Recital) or full (MUSC 480 (<https://bulletin.ndsu.edu/search/?P=MUSC%20480>) Recital) recital with program notes.
 - Approved research project on a topic related to music; requires a formal written document (MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study).
 - Approved internship, such as directing an ensemble (e.g. church choir), teaching at the NDSU Academy, observed regularly by the advisor, with a formal written document of the experience (MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study).
 - Approved "lecture recital" with a formal presentation. Lecture recital should be at least the same length as a half recital (MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study)
 - Performance or major opera role or a major solo with ensemble in a formal concert, accompanied by a summary document (MUSC 494 (<https://bulletin.ndsu.edu/search/?P=MUSC%20494>) Individual Study)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130		3 MUSC 103 ^{counts as a Humanities and Fine Arts Gen Ed}	3
MUSC 132		1 MUSC 131	3
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)		1 MUSC 133	1
MUSC 1XX Applied Study		1 MUSC 161	1
MUSC 173		1 MUSC 1XX Applied Study	1
MUSC 180		0 MUSC 173	1
MUSC 189		1 MUSC 180	0
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
ENGL 110		3 MUSC 1XX Minor Ensemble	1
COMM 110		3 ENGL 120	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 180	0

MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
MUSC 273	1	MUSC 273	1
MUSC 3XX Major Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 1XX Minor Ensemble	1	MUSC 1XX Minor Ensemble	1
MUSC 385	3	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/ Lab Gen Ed	4
Science & Technology Gen Ed	3		
	18		16

Junior			
Fall	Credits	Spring	Credits
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 380	1
MUSC 331		2 MUSC 3XX Major Ensemble	1
MUSC 340 ^{counts as a Humanities and Fine Arts Gen Ed}		3 MUSC 1XX Minor Ensemble	1
MUSC 344		2 MUSC 3XX Applied Study	1
MUSC 3XX Major Ensemble		1 MUSC 373 (1 credit of pedagogy)	3
MUSC 3XX Applied Study		1 Jazz Studies	1
MUSC 373 ^{1 credit of pedagogy}		3 MUSC 411 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	(3)
Jazz Studies		1 ENGL 323 (or any upper division English course approved by advisor)	3
MUSC 441		2	
	17		14

Senior			
Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
Jazz Studies		1 Jazz Studies	1
MUSC 431 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}		3 MUSC 430 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	3
MUSC 4XX Applied Studies		1 MUSC 4XX Applied Study	1
MUSC 473		3 MUSC 473	3
Science & Technology/Global Perspectives Gen Ed		3 MUSC 480	1

Wellness Gen Ed	2	Quantitative Reasoning Gen Ed	3
	14		13

Total Credits: 122

STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - EVEN YEAR - FALL SEMESTER		MUSC 103 ^{counts as a Humanities and Fine Arts Gen Ed}	3
MUSC 130		3 MUSC 131	3
MUSC 132		1 MUSC 133	1
MUSC 160 (Up to 2 semesters of MUSC 165 with permission)		1 MUSC 161	1
MUSC 1XX Applied Study		1 MUSC 1XX Applied Study	1
MUSC 173		1 MUSC 173	1
MUSC 180		0 MUSC 180	0
MUSC 189		1 MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble		1 ENGL 120	3
ENGL 110		3 Science & Technology Gen Ed	3
COMM 110		3	
	15		17

Sophomore			
Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 180	0
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 260		1 MUSC 261	1
MUSC 2XX Applied Study		1 MUSC 2XX Applied Study	1
MUSC 273		1 MUSC 273	1
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 1XX Minor Ensemble		1 MUSC 1XX Minor Ensemble	1
MUSC 385		3 Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed		3 Science & Technology w/ Lab Gen Ed	4
	15		16

Junior			
Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 380	1
MUSC 340 ^{counts as a Humanities and Fine Arts Gen Ed}		3 MUSC 3XX Applied Study	1

MUSC 3XX Applied Study	1	MUSC 373 (1 credit of pedagogy)	3
MUSC 373 ¹ credit of pedagogy	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 1XX Minor Ensemble	1
MUSC 1XX Minor Ensemble	1	Jazz Studies	1
Jazz Studies	1	MUSC 430 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	3
MUSC 431 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	(3)	ENGL 323 (or any upper division English course approved by advisor)	3
Wellness Gen Ed	2		
	14		17
Senior			
Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 331	2	MUSC 3XX Major Ensemble	1
MUSC 344	2	MUSC 411 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	3
MUSC 3XX Major Ensemble	1	MUSC 4XX Applied Study	1
MUSC 441	2	MUSC 473	3
MUSC 4XX Applied Study	1	MUSC 480	1
MUSC 473	3	Jazz Studies	1
Jazz Studies	1	Quantitative Reasoning Gen Ed	3
Science & Technology/Global Perspectives Gen Ed	3		
	15		13

Total Credits: 122

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

STUDENTS ENTERING AS A FRESHMAN IN AN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - ODD YEAR - FALL SEMESTER		MUSC 103 ^{counts as a Humanities and Fine Arts Gen Ed}	3
MUSC 130	3	MUSC 131	3
MUSC 132	1	MUSC 133	1
MUSC 165	1	MUSC 165	1
MUSC 180	0	MUSC 173	1
MUSC 189 ¹	1	MUSC 180	0
ENGL 110	3	ENGL 120	3
COMM 110	3	Quantitative Reasoning Gen Ed	3

Science & Technology Gen Ed	3		
	15		15
Sophomore			
Fall	Credits	Spring	Credits
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 180	0
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 265		1 MUSC 265	1
MUSC 273		2 MUSC 273	2
MUSC 385		3 MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble		1 MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble		1 Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed		3 Science & Technology w/ Lab Gen Ed	4
	15		16
Junior			
Fall	Credits	Spring	Credits
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 365	1
MUSC 340 ^{counts as a Humanities and}		3 MUSC 373	2
MUSC 365		1 MUSC 3XX Major Ensemble	1
MUSC 373		2 MUSC 3XX Minor Ensemble	1
MUSC 3XX Major Ensemble		1 MUSC 380	1
MUSC 3XX Minor Ensemble		1 MUSC 423	2
MUSC 443		3 MUSC 411	3
ENGL 323 (or any upper division English course approved by advisor)		3 Jazz Studies	1
	16		15
Senior			
Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble		1 MUSC 3XX Minor Ensemble	1
MUSC 431		3 MUSC 424	2
MUSC 442 (or MUSC 344 Wind Band Literature or MUSC 346 Survey/ Vocal Literature or MUSC 441 Symphonic Literature)		2 MUSC 430	3
MUSC 465		1 MUSC 465	1
MUSC 473		3 MUSC 473	3

Science & Technology/Global Perspectives Gen Ed	3	MUSC 480	1
Wellness Gen Ed	2	Jazz Studies	1
	16		13

Total Credits: 121

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* Music majors may not declare a music minor.

STUDENTS ENTERING AS A FRESHMAN IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - EVEN YEAR - FALL SEMESTER		MUSC 103 ^{counts as a Humanities and Fine Arts Gen Ed}	3
MUSC 130		3 MUSC 131	3
MUSC 132		1 MUSC 133	1
MUSC 165		1 MUSC 165	1
MUSC 180		0 MUSC 173	1
MUSC 189 ¹		1 MUSC 180	0
ENGL 110		3 ENGL 120	3
COMM 110		3 Quantitative Reasoning Gen Ed	3
Science & Technology Gen Ed		3	
		15	15

Sophomore			
Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 180	0
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 265		1 MUSC 265	1
MUSC 273		2 MUSC 273	2
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble		1 MUSC 3XX Minor Ensemble	1
MUSC 385		3 MUSC 423	2
Social & Behavioral Sciences Gen Ed		3 Science & Technology w/ Lab Gen Ed	4
		15	15

Junior			
Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 365	1

MUSC 340 ^{counts as a Humanities and}	3	MUSC 373	2
MUSC 365	1	MUSC 380	1
MUSC 373	2	MUSC 3XX Major Ensemble	1
MUSC 3XX Major ensemble	1	MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble	1	MUSC 424	2
MUSC 431	3	MUSC 430	3
MUSC 442 (or MUSC 344 Wind Band Literature or MUSC 346 Survey/ Vocal Literature or MUSC 441 Symphonic Literature)	2	Jazz Studies	1
Jazz Studies	1		
	16		15
Senior			
Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble	1	MUSC 411	3
MUSC 3XX Minor Ensemble	1	MUSC 3XX Major Ensemble	1
MUSC 443	3	MUSC 3XX Minor Ensemble	1
MUSC 465	1	MUSC 465	1
MUSC 473	3	MUSC 473	3
ENGL 323 (or any upper division English course approved by advisor)	3	MUSC 480	1
Wellness Gen Ed	2	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Science & Technology/Global Perspectives Gen Ed	3		
	17		13

Total Credits: 121

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* Music majors may not declare a music minor.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN ODD-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - ODD YEAR - FALL SEMESTER		FRESHMAN - EVEN YEAR - SPRING SEMESTER	
MUSC 130	3	MUSC 103 ^{counts as a Humanities and Fine Arts Gen Ed}	3
MUSC 132	1	MUSC 131	3

MUSC 160 (Up to 2 semesters of MUSC 165 with permission)	1	MUSC 133	1
MUSC 167	1	MUSC 161	1
MUSC 174	1	MUSC 167	1
MUSC 180	0	MUSC 173	1
MUSC 189 ¹	1	MUSC 175	1
MUSC 3XX Major Ensemble	1	MUSC 180	0
ENGL 110	3	MUSC 3XX Major Ensemble	1
COMM 110	3	ENGL 120	3
		Quantitative Reasoning Gen Ed	3

15

18

Sophomore

Fall	Credits	Spring	Credits
SOPHOMORE - EVEN YEAR - FALL SEMESTER		SOPHOMORE - ODD YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 180	0
MUSC 230	3	MUSC 231	3
MUSC 232	1	MUSC 233	1
MUSC 260	1	MUSC 261	1
MUSC 267	1	MUSC 267	1
MUSC 273	1	MUSC 273	2
MUSC 385	3	MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble	1	Social & Behavioral Sciences/ Cultural Diversity Gen Ed	3
Social & Behavioral Sciences Gen Ed	3	Science & Technology w/Lab Gen Ed	4
Wellness Gen Ed	2		

16

16

Junior

Fall	Credits	Spring	Credits
JUNIOR - ODD YEAR - FALL SEMESTER		JUNIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 180	0	MUSC 341	3
MUSC 250	2	MUSC 350	2
MUSC 340 ^{counts as a Humanities and}	3	MUSC 367	1
MUSC 349	2	MUSC 373	2
MUSC 367	1	MUSC 3XX Major Ensemble	1
MUSC 373	2	MUSC 3XX Minor Ensemble	1
MUSC 3XX Major Ensemble	1	MUSC 380	1
MUSC 3XX Minor Ensemble	1	MUSC 411 ^{need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431}	3
FREN 101 (or German I)	4	FREN 102 (or German II)	4
ENGL 323 (or any upper division English course approved by advisor)	3		

19

18

Senior			
Fall	Credits	Spring	Credits
SENIOR - EVEN YEAR - FALL SEMESTER		SENIOR - ODD YEAR - SPRING SEMESTER	
MUSC 3XX Major Ensemble		1 MUSC 346	2
MUSC 3XX Minor Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 431 ¹ need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431		3 MUSC 3XX Minor Ensemble	1
MUSC 442		2 MUSC 430 ¹ need 2 courses of Advanced Theory from MUSC 411, MUSC 430, MUSC 431	(3)
MUSC 467		1 MUSC 467	1
MUSC 473 (Students may take THEA 268 Acting the Song I instead of 3 credits of Supplementary Applied Study)		3 MUSC 473	3
GERM 101 (or French I)		4 MUSC 480	1
Science & Technology/Global Perspectives Gen Ed		3 GERM 102 (or French II)	4
		Science & Technology Gen Ed	3
		18	16

Total Credits: 136

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* Music majors may not declare a music minor.

FOR FRESHMAN ENROLLING FOR THE FIRST TIME IN AN EVEN-YEAR FALL

A grade of 'C' or better is required in all MUSC prefix courses.

Freshman			
Fall	Credits	Spring	Credits
FRESHMAN - EVEN YEAR - FALL SEMESTER		FRESHMAN - ODD YEAR - SPRING SEMESTER	
MUSC 130		3 MUSC 103	3
MUSC 132		1 MUSC 131	3
MUSC 160		1 MUSC 133	1
MUSC 167		1 MUSC 161	1
MUSC 174		1 MUSC 167	1
MUSC 180		0 MUSC 173	1
MUSC 189		1 MUSC 175	1
MUSC 3XX Major Ensemble		1 MUSC 180	0
ENGL 110		3 MUSC 3XX Major Ensemble	1
COMM 110		3 ENGL 120	3
		Quantitative Reasoning Gen Ed	3
		15	18

Sophomore			
Fall	Credits	Spring	Credits
SOPHOMORE - ODD YEAR - FALL SEMESTER		SOPHOMORE - EVEN YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 180	0
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 260		1 MUSC 261	1
MUSC 267		1 MUSC 267	1
MUSC 273		1 MUSC 273	2
MUSC 385		3 MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble		1 Social & Behavioral/Cultural Diversity Gen Ed	3
Social & Behavioral Gen Ed		3 Science & Technology w/ Lab Gen Ed	4
Science & Technology/Global Perspectives Gen Ed		3	
Wellness Gen Ed		2	
		19	16
Junior			
Fall	Credits	Spring	Credits
JUNIOR - EVEN YEAR - FALL SEMESTER		JUNIOR - ODD YEAR - SPRING SEMESTER	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 346	2
MUSC 340		3 MUSC 367	1
MUSC 367		1 MUSC 373	2
MUSC 373		2 MUSC 3XX Major Ensemble	1
MUSC 3XX Major Ensemble		1 MUSC 3XX Minor Ensemble	1
MUSC 3XX Minor Ensemble		1 MUSC 380	1
MUSC 431		3 MUSC 430	3
MUSC 442		2 FREN 102 (or German II)	4
FREN 101 (or German I)		4	
		19	18
Senior			
Fall	Credits	Spring	Credits
SENIOR - ODD YEAR - FALL SEMESTER		SENIOR - EVEN YEAR - SPRING SEMESTER	
MUSC 349		2 MUSC 350	2
MUSC 3XX Major Ensemble		1 MUSC 3XX Major Ensemble	1
MUSC 3XX Minor Ensemble		1 MUSC 3XX Minor Ensemble	1
MUSC 467		1 MUSC 411	(3)
MUSC 473		3 MUSC 473	3-4
ENGL 323 (or any upper division English course approved by advisor)		3 MUSC 473	3
GERM 101 (or French I)		4 MUSC 480	1

Science & Technology Gen Ed	3 GERM 102	4
	18	15-16

Total Credits: 138-139

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- * Music majors may not declare a music minor.

Music

Department Information

- **Department Location:**
Reineke Fine Arts Center
- **Department Phone:**
701-231-7932
- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/music/ (<http://www.ndsu.edu/performingarts/music/>)
- **Credential Offered:**
B.S.; B.A.; B.Mus.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/music/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/music/>)

Major Requirements

Major: Music

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6

Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
Capstone Experience (choose from following:) ²		1

MUSC 380	Recital	
MUSC 480	Recital	
MUSC 494	Individual Study	
Applied Music: Select 6 credits from the following:		6
MUSC 165	Applied Piano	
MUSC 167	Applied Voice	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 267	Applied Voice	
MUSC 268	Applied Wind Instruments	
MUSC 269	Applied Percussion Instruments	
MUSC 270	Applied Upper Strings	
MUSC 271	Applied Lower Strings	
MUSC 272	Applied Guitar	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 367	Applied Voice	
MUSC 368	Applied Wind Instruments	
MUSC 369	Applied Percussion Instruments	
MUSC 370	Applied Upper Strings	
MUSC 371	Applied Lower Strings	
MUSC 372	Applied Guitar	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 467	Applied Voice	
MUSC 468	Applied Wind Instruments	
MUSC 469	Applied Percussion Instruments	
MUSC 470	Applied Upper Strings	
MUSC 471	Applied Lower Strings	
MUSC 472	Applied Guitar	
MUSC 473	Supplementary Applied Study	
Major Ensemble: Select 6 credits from the following:		6
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Music Electives or Emphasis Courses		15
Total Credits		57

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- ² B.A./B.S. Recital Capstone or Individual Study Capstone is fulfilled by registration in MUSC 380 Recital, MUSC 480 Recital, or MUSC 494 Individual Study. The MUSC 494 Individual Study registration is approved by the music faculty and supervised by the adviser. Possibilities include:
- Half (MUSC 380 Recital) or full (MUSC 480 Recital) recital with program notes.
 - Approved research project on a topic related to music; requires a formal written document (MUSC 494 Individual Study).
 - Approved internship, such as directing an ensemble (e.g. church choir), teaching at the NDSU Academy, observed regularly by the advisor, with a formal written document of the experience (MUSC 494 Individual Study).
 - Approved "lecture recital" with a formal presentation. Lecture recital should be at least the same length as a half recital (MUSC 494 Individual Study)
 - Performance or major opera role or a major solo with ensemble in a formal concert, accompanied by a summary document (MUSC 494 Individual Study)

Degree Requirements and Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Instrumental Performance

Degree Type: B.Mus.

Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 380	Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory - select 2 of the following 3 courses		6
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
Pedagogy: Select 2 credits from the following:		2
MUSC 173	Supplementary Applied Study	
MUSC 273	Supplementary Applied Study	
MUSC 373	Supplementary Applied Study	
MUSC 473	Supplementary Applied Study	
Applied Music: Select 22 credits from the following: (2 semesters each of 100 level, 200 level, 300 level; 1 semester of 400 level)		22
Wind Instruments:		
MUSC 168 & MUSC 173	Applied Wind Instruments and Supplementary Applied Study	1-3
MUSC 268 & MUSC 273	Applied Wind Instruments and Supplementary Applied Study	1-3
MUSC 368 & MUSC 373	Applied Wind Instruments and Supplementary Applied Study	1-4
MUSC 468 & MUSC 473	Applied Wind Instruments and Supplementary Applied Study	1-5
Percussion:		
MUSC 169 & MUSC 173	Applied Percussion Instruments and Supplementary Applied Study	1-3
MUSC 269 & MUSC 273	Applied Percussion Instruments and Supplementary Applied Study	1-3
MUSC 369 & MUSC 373	Applied Percussion Instruments and Supplementary Applied Study	1-4
MUSC 469 & MUSC 473	Applied Percussion Instruments and Supplementary Applied Study	1-5
Upper Strings:		
MUSC 170 & MUSC 173	Applied Upper Strings and Supplementary Applied Study	1-3
MUSC 270 & MUSC 273	Applied Upper Strings and Supplementary Applied Study	1-3

MUSC 370 & MUSC 373	Applied Upper Strings and Supplementary Applied Study	1-4
MUSC 470 & MUSC 473	Applied Upper Strings and Supplementary Applied Study	1-5
Lower Strings:		
MUSC 171 & MUSC 173	Applied Lower Strings and Supplementary Applied Study	1-3
MUSC 271 & MUSC 273	Applied Lower Strings and Supplementary Applied Study	1-3
MUSC 371 & MUSC 373	Applied Lower Strings and Supplementary Applied Study	1-4
MUSC 471 & MUSC 473	Applied Lower Strings and Supplementary Applied Study	1-5
Guitar:		
MUSC 172 & MUSC 173	Applied Guitar and Supplementary Applied Study	1-3
MUSC 272 & MUSC 273	Applied Guitar and Supplementary Applied Study	1-3
MUSC 372 & MUSC 373	Applied Guitar and Supplementary Applied Study	1-4
MUSC 472 & MUSC 473	Applied Guitar and Supplementary Applied Study	1-5
Instrumental Track		
MUSC 331	Instrumental Arranging	2
Literature		
MUSC 344 or MUSC 441	Wind Band Literature Symphonic Literature	2
Applied Piano: Class or individual study		4
MUSC 160 or MUSC 165	Piano Class I (Up to 2 semesters of MUSC 165 with permission) Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Jazz Studies: Select 4 credits from the following:		4
MUSC 311	Jazz Ensemble	
MUSC 357	Marching Band Methods and Techniques	
MUSC 364	Jazz Improvisation	
MUSC 384	Composition I	
MUSC 484	Composition II	
Major Ensemble: Select 8 credits from the following:		8
MUSC 303	Wind Symphony (or as approved by adviser)	
MUSC 304	University Symphony Orchestra (for string majors)	
Minor Ensembles: Select 4 credits from the following:		4
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Or as approved by adviser		

Total Credits**107-162**

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Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Piano Performance

Degree Type: B.Mus.
Minimum Degree Credits to Graduate: 128

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of ‘C’ or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3

MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
MUSC 411	Form and Analysis	3
MUSC 430	Counterpoint	3
MUSC 431	Contemporary Harmonic Techniques	3
MUSC 380	Recital	1
MUSC 480	Recital	1
Applied Music: Select 22 credits from the following:		22
MUSC 165	Applied Piano	
MUSC 173	Supplementary Applied Study	
MUSC 265	Applied Piano	
MUSC 273	Supplementary Applied Study	
MUSC 365	Applied Piano	
MUSC 373	Supplementary Applied Study	
MUSC 465	Applied Piano	
MUSC 473	Supplementary Applied Study	
Piano Track		
MUSC 443	Keyboard Literature (Take two times.)	6
Additional Literature: Select one of the following:		2
MUSC 344	Wind Band Literature	
MUSC 346	Survey/Vocal Literature	
MUSC 441	Symphonic Literature	
MUSC 442	Opera Literature	
Pedagogy:		
MUSC 423	Piano Pedagogy I	2
MUSC 424	Piano Pedagogy II	2
Jazz Studies: Select 2 credits from the following:		2
MUSC 311	Jazz Ensemble	
MUSC 322	Jazz Combo	
MUSC 358	Jazz Methods	
MUSC 364	Jazz Improvisation	
Major Ensembles: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Minor Ensembles: Select 6 credits from the following:		6
MUSC 311	Jazz Ensemble	
MUSC 318	Mixed Chamber Ensemble	

MUSC 321	Piano Chamber Music	
MUSC 322	Jazz Combo	
Select 3 credits from the following:		3
MUSC 319	Opera Workshop	
MUSC 321	Piano Chamber Music	
MUSC 384	Composition I	
MUSC 484	Composition II	
MUSC 494	Individual Study	
Total Credits		89

- ¹ MUSC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.

Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music - Vocal Performance

Degree Type: B.Mus

Minimum Degree Credits to Graduate: 142

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 380	Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
Advanced Theory - select 2 of the following 3 courses		6
MUSC 411	Form and Analysis	
MUSC 430	Counterpoint	
MUSC 431	Contemporary Harmonic Techniques	
Applied Music Select 22 credits from the following:		22
MUSC 167	Applied Voice	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 267	Applied Voice	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 367	Applied Voice	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 467	Applied Voice	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
THEA 268	Acting the Song I (Students may take this course instead of 3 credits of Supplementary Applied Study)	3
Vocal Track		
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 346	Survey/Vocal Literature	2
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 350	Vocal Methods & Pedagogy II	2
MUSC 442	Opera Literature	2
Language		
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4

Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	
Major Ensemble: Select 8 credits from the following:		8
MUSC 306	Concert Choir (or as approved by adviser)	
Minor Ensemble: Select 4 credits from the following:		4
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Or as approved by adviser		
Total Credits		103

- ¹ MUSC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.

Degree Notes

- Music majors may not declare a music minor.

Major Requirements

Major: Music Composition

Degree Type: B.Mus.

Minimum Degree Credits to Graduate: 123

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		

Global Perspectives (G) **†**Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Code	Title	Credits
Music Core Requirements		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 385	Music Entrepreneurship	3
MUSC 480	Recital	1
MUSC 494	Individual Study	1
Applied Music - Select 6 credits from one of the following applied music disciplines:		6
Applied Piano		
MUSC 165	Applied Piano	
MUSC 265	Applied Piano	
MUSC 365	Applied Piano	
MUSC 465	Applied Piano	
Applied Voice		
MUSC 167	Applied Voice	
MUSC 267	Applied Voice	
MUSC 367	Applied Voice	
MUSC 467	Applied Voice	
Applied Wind Instruments		
MUSC 168	Applied Wind Instruments	
MUSC 268	Applied Wind Instruments	
MUSC 368	Applied Wind Instruments	
MUSC 468	Applied Wind Instruments	
Applied Percussion Instruments		
MUSC 169	Applied Percussion Instruments	
MUSC 269	Applied Percussion Instruments	
MUSC 369	Applied Percussion Instruments	
MUSC 469	Applied Percussion Instruments	
Applied Upper String		
MUSC 170	Applied Upper Strings	
MUSC 270	Applied Upper Strings	
MUSC 370	Applied Upper Strings	
MUSC 470	Applied Upper Strings	
Applied Lower Strings		

MUSC 171	Applied Lower Strings	
MUSC 271	Applied Lower Strings	
MUSC 371	Applied Lower Strings	
MUSC 471	Applied Lower Strings	
Applied Guitar		
MUSC 172	Applied Guitar	
MUSC 272	Applied Guitar	
MUSC 372	Applied Guitar	
MUSC 472	Applied Guitar	
Major Ensembles - Select 6 credits from the following:		6
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 306	Concert Choir	
Minor Ensembles - Select 4 credits from the following:		4
MUSC 312	Percussion Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 317	Madrigal Singers	
MUSC 318	Mixed Chamber Ensemble	
MUSC 320	Vocal Chamber Ensemble	
MUSC 321	Piano Chamber Music	
MUSC 322	Jazz Combo	
Piano Classes		
MUSC 160	Piano Class I	1
MUSC 161	Piano Class II	1
MUSC 260	Piano Class III	1
MUSC 261	Piano Class IV	1
Composition Core		
MUSC 250	Basic Conducting	2
MUSC 331	Instrumental Arranging	2
MUSC 351	Instrumental Conducting & Literature	2
or MUSC 352	Choral Conducting & Literature	
MUSC 430	Counterpoint	3
Applied Composition - Select 13 credits from the following (one semester of 100 level; 2 semesters each of 200 level, 300 level, and 400 level)		
MUSC 166	Applied Composition	1
MUSC 266	Applied Composition (Enroll two times but in different semesters)	2
MUSC 273	Supplementary Applied Study (Enroll two times but in different semesters)	2
MUSC 366	Applied Composition (Enroll two times but in different semesters)	2
MUSC 373	Supplementary Applied Study (Enroll two times but in different semesters)	2
MUSC 466	Applied Composition (Enroll two times but in different semesters)	2
MUSC 473	Supplementary Applied Study (Enroll two times but in different semesters)	2
Upper Division Theory - Select from the following:		3
MUSC 411	Form and Analysis	
MUSC 431	Contemporary Harmonic Techniques	
MUSC 434	Analytical Techniques	
Electives determined in consultation with Advisor		8

(Substitution form with course selection must be submitted to the Office of Registration and Records to receive credit for the electives.)

Total Credits	84
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Minor Requirements

Minor: Music

Required Credits: 20

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		2
Major Ensemble Electives		2
Electives		5
Total Credits		20

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Music Education

Department Information

- **Department Location:**
Reineke Fine Arts Center
- **Department Phone:**
701-231-7932
- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/music/ (<http://www.ndsu.edu/performingarts/music/>)
- **Credential Offered:**
B.Mus.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/music-education/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/music-education/>)

Major Requirements

Major: Music Education - Instrumental Music Track

Degree Type: B.Mus

Minimum Degree Credits to Graduate: 143

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

- A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
HDFS 230 or PSYC 250	Life Span Development (May satisfy general education category B) Developmental Psychology	3
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 331	Instrumental Arranging	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 344	Wind Band Literature	2
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 351	Instrumental Conducting & Literature	2
MUSC 352	Choral Conducting & Literature	2
MUSC 353	Woodwind Methods I	2
MUSC 354	Woodwind Methods II	2
MUSC 355	Brass Methods	2

MUSC 357	Marching Band Methods and Techniques	1
MUSC 358	Jazz Methods	1
MUSC 359	Percussion Methods	2
MUSC 380	Recital	1
or MUSC 480	Recital	
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Instrumental Track Requirements		
Major Instrumental Ensemble: Must enroll in MUSC 303 Wind Symphony for 5 semesters and MUSC 111 Marching Band for 2 semesters.		7
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra (for string majors)	
MUSC 111	Marching Band	
Minor Ensembles: Must enroll in 2 different semesters as approved by adviser. May be selected from the following ensembles:		2
MUSC 112	University Band	
MUSC 311	Jazz Ensemble	
MUSC 314	Brass Chamber Ensemble	
MUSC 315	Woodwind Chamber Ensemble	
MUSC 316	String Chamber Ensemble	
MUSC 318	Mixed Chamber Ensemble	
MUSC 322	Jazz Combo	
Major Choral Ensemble (Must enroll for 2 different semesters as approved by adviser):		2
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
Applied Voice:		
MUSC 163	Voice Class for Instrumentalists	2
MUSC 165	Applied Piano	
Applied Major Instrument: All students enrolled in applied instruction must participate in a major ensemble specific to their area. Two semesters each of 100 level, 200 level, and 300 level. One semester of 400 level. Select from the following:		7
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 165	Applied Piano (up to 2 semesters with permission)	
MUSC 160	Piano Class I	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	

- ¹ MUSC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.
- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Requirements and Notes

- Music majors may not declare a music minor.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Major Requirements

Major: Music Education - Vocal Music Track

Degree Type: B.Mus

Minimum Degree Credits to Graduate: 151

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**}		
Global Perspectives (G) ^{**}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
Music Core Requirements for Education Majors		
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
HDFS 230 or PSYC 250	Life Span Development (May satisfy general education category B) Developmental Psychology	3
MUSC 103	Introduction to Music History (May satisfy general education category A)	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 174	Pronunciation for Singers I	1
MUSC 175	Pronunciation for Singers II	1
MUSC 189	Skills for Academic Success ¹	1
MUSC 230	Theory and Analysis III	3
MUSC 231	Theory and Analysis IV	3
MUSC 232	Ear Training & Sight Singing III	1
MUSC 233	Ear Training & Sight Singing IV	1
MUSC 250	Basic Conducting	2
MUSC 332	Survey of Choral Literature	2
MUSC 340	Music History I	3
MUSC 341	Music History II	3
MUSC 349	Vocal Methods & Pedagogy I	2
MUSC 350	Vocal Methods & Pedagogy II	2
MUSC 351	Instrumental Conducting & Literature	2
MUSC 352	Choral Conducting & Literature	2
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
MUSC 380 or MUSC 480	Recital Recital	1
MUSC 385	Music Entrepreneurship	3
MUSC 481	Instrumental Music Methods	2
MUSC 482	Choral Music Methods	2
MUSC 483	Elementary Music Methods	2
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Vocal Track Requirements		
Major Choral Ensemble: Must be taken in 7 different semesters. Select from the following in consultation with adviser:		7
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 306	Concert Choir	

Minor Choral/Vocal Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 215	University Chamber Singers	
MUSC 317	Madrigal Singers	
MUSC 319	Opera Workshop	
Major Instrumental Ensemble: Must be taken in 2 different semesters. Select two credits from the following in consultation with adviser:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
MUSC 304	University Symphony Orchestra	
MUSC 311	Jazz Ensemble	
Applied Voice: Must enroll in the following as indicated:		7
MUSC 167	Applied Voice (for 2 semesters)	
MUSC 267	Applied Voice (for 2 semesters)	
MUSC 367	Applied Voice (for 2 semesters)	
MUSC 467	Applied Voice (for 1 semester)	
Students enrolled in applied instruction must participate in a major ensemble specific to applied area.		
Applied Piano: Private (MUSC 165) or class (MUSC 160; MUSC 161; MUSC 260; MUSC 261)		4
MUSC 160	Piano Class I (Up to 2 semesters of MUSC 165 with permission)	
or MUSC 165	Applied Piano	
MUSC 161	Piano Class II	
MUSC 260	Piano Class III	
MUSC 261	Piano Class IV	

Total Credits	112
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- ¹ MUSC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take MUSC 189.

Proficiency Waiver

- Piano proficiency exam must be completed before student teaching.
- Piano credit requirements listed may be waived in whole or in part for successful completion of the piano proficiency.
- Piano majors may fulfill this requirement by accompanying or performance on a secondary medium according to the discretion of the student's applied instructor/adviser.

Degree Notes

- Music majors may not declare a music minor.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Minor Requirements

Minor: Music Education

Required Credits: 19

Code	Title	Credits
Required Courses		
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
Applied Study Electives		2
Major Ensemble Electives		2
Music Education Practicum: Select one of the following:		2
MUSC 481	Instrumental Music Methods	

MUSC 482	Choral Music Methods	
MUSC 483	Elementary Music Methods	
Music Education Methods: Select one from the following:		2
MUSC 349	Vocal Methods & Pedagogy I	
MUSC 353	Woodwind Methods I	
MUSC 355	Brass Methods	
MUSC 359	Percussion Methods	
Total Credits		19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Minor Requirements

Instrumental Music Education Minor

Required Credits: 19

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 351	Instrumental Conducting & Literature	2
Instrumental Ensemble: Select 2 credits from the following:		2
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 303	Wind Symphony	
Music Education Methods		
MUSC 353	Woodwind Methods I	2
MUSC 355	Brass Methods	2
MUSC 359	Percussion Methods	2
Music Education Practicum		
MUSC 481	Instrumental Music Methods	2
Total Credits		23

Minor Requirements

Minor: Vocal Music Education

Required Credits: 20

Code	Title	Credits
MUSC 103	Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 131	Theory and Analysis II	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 133	Ear Training & Sight Singing II	1
MUSC 352	Choral Conducting & Literature	2
Choral Ensemble: Select 2 credits from the following:		2
MUSC 116	Cantemus	
MUSC 117	Statesmen of NDSU	
MUSC 215	University Chamber Singers	
MUSC 306	Concert Choir	
Music Education Methods		

MUSC 162	Voice Class	1
MUSC 163	Voice Class for Instrumentalists	2
Music Education Practicum		
MUSC 482	Choral Music Methods	2
Total Credits		20

Music Education

Department Information

- **Department Location:**
Reineke Fine Arts Center
- **Department Phone:**
701-231-7932
- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/music/ (<http://www.ndsu.edu/performingarts/music/>)
- **Credential Offered:**
B.Mus.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/music-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/music-education/>)

The **Bachelor of Music in Music Education** (B.Mus.) includes licensure requirements for teacher candidates to teach music in North Dakota's public schools. Teacher candidates will be certified to teach K-12 after completing all requirements from the music education curriculum. Though the degree contains comprehensive preparation, students generally elect a principal area in either instrumental or voice/choral.

Licensure in Music Education

Teacher candidates must complete the School of Education (<https://www.ndsu.edu/education/>) requirements, complete the common core music requirements, complete either the vocal or instrumental emphasis and pass a piano proficiency examination prior to student teaching. Piano credit requirements may be waived in whole or in part upon successful completion of the piano proficiency examinations. Specific general education requirements, School of Education requirements, and other information may be obtained from the Division of Performing Arts (<https://www.ndsu.edu/performingarts/>) office.

Ensembles

The NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, University Symphony Orchestra, Madrigal Singers, two large Jazz Ensembles, Jazz Combos, the Gold Star Marching Band, Brass Ensemble, University Chamber Singers, NDSU Statesmen, Cantemus, University Band, Bison Pep Bands, NDSU Opera Theatre, and chamber ensembles in typical instrumental and vocal combinations. The Concert Choir, Wind Symphony, Jazz Ensemble, Madrigal Singers and several other groups have touring programs, some of which are national or international in scope. Participation in these ensembles is open to all students, some by audition and some as open-enrollment ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 28) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

Sample Program Guide

instrumental music education

9 Semester Plan of Study for Students entering in EVEN Fall.

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 111		1 MUSC 103 (Gen Ed category A)	3
MUSC 130		3 MUSC 131	3
MUSC 132		1 MUSC 133	1
MUSC 160		1 MUSC 161	1
MUSC 189		1 MUSC 1XX Applied Study	1
MUSC 1XX Applied Study		1 MUSC 1XX Choir	1
MUSC 1XX Choir		1 PSYC 250 (or HDFS 230 - either course counts as Gen Ed Category B)	3
MUSC 1XX Minor Ens.		1 ENGL 120 (Gen Ed category C)	3
ENGL 110 (Gen Ed category C)		3	
PSYC 111 (Gen Ed category B)		3	
		16	16
Second Year			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 111		1 MUSC 163	2
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 260		1 MUSC 261	1
MUSC 2XX Applied Study		1 MUSC 2XX Applied Study	1
EDUC 321		3 MUSC 3XX Band	1
Science & Technology - Gen Ed category S and category G ^{Select a course that fulfills both categories}		3 EDUC 322	3
COMM 110 (Gen Ed category C)		3 Science & Technology w/lab - Gen Ed category S	4
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		16	16
Third Year			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 250		2 MUSC 341	3
MUSC 340 (Gen Ed category A)		3 MUSC 351	2
MUSC 353		2 MUSC 354	2
MUSC 357		1 MUSC 359	2
MUSC 358		1 MUSC 3XX Applied Study	1
MUSC 482		2 MUSC 3XX Band	1
MUSC 3XX Applied Study		1 MUSC 1XX Minor Ens.	1
MUSC 3XX Band		1 Cultural Diversity - Gen Ed category D	3
EDUC 451		3 EDUC 486	3
		16	18

Fourth Year			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 331		2 MUSC 480	1
MUSC 344		2 MUSC 3XX Band	1
MUSC 349		2 MUSC 483	2
MUSC 352		2 EDUC 489	3
MUSC 355		2 Science & Technology - Gen Ed category S	3
MUSC 385		3 Quantitative Reasoning - Gen Ed category R	3
MUSC 481		2 ENGL 322 (Upper Division Writing Gen Ed - Writing and the Creative Process)	3
MUSC 4XX Applied Study		1 Wellness - Gen Ed category W	2
MUSC 3XX Band		1	
		17	18

Fifth Year			
Fall	Credits		
EVEN YEAR			
EDUC 485		1	
EDUC 487		9	
EDUC 488		3	
		13	

Total Credits: 146

9 Semester Plan of Study for Students entering in ODD Fall.

First Year			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 111		1 MUSC 103 (Gen Ed category A)	3
MUSC 130		3 MUSC 131	3
MUSC 132		1 MUSC 133	1
MUSC 160		1 MUSC 161	1
MUSC 189		1 MUSC 1XX Applied Study	1
MUSC 1XX Applied Study		1 MUSC 1XX Choir	1
MUSC 1XX Choir		1 PSYC 250 (Gen Ed category B)	3
MUSC 1XX Minor Ens.		1 ENGL 120 (Gen Ed category C)	3
ENGL 110 (Gen Ed category C)		3	
PSYC 111 (Gen Ed category B)		3	
		16	16

Second Year			
Fall	Credits	Spring	Credits
MUSC 111		1 MUSC 163	2
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1

MUSC 260	1	MUSC 261	1
MUSC 2XX Applied Study	1	MUSC 2XX Applied Study	1
Science & Technology - Gen Ed	3	MUSC 3XX Band	1
course that fulfills both categories			
COMM 110 (Gen Ed category C)	3	EDUC 322	3
EDUC 321	3	Science & Technology w/lab - Gen Ed category S	4
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	

16 **16**

Third Year			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 250		2 MUSC 341	3
MUSC 331		2 MUSC 351	2
MUSC 340 (Gen Ed category A)		3 MUSC 354	2
MUSC 344		2 MUSC 359	2
MUSC 353		2 MUSC 3XX Applied Study	1
MUSC 482		2 MUSC 3XX Band	1
MUSC 3XX Applied Study		1 MUSC 1XX Minor Ens.	1
MUSC 3XX Band		1 Cultural Diversity - Gen Ed category D	3
EDUC 451		3 EDUC 486	3

18 **18**

Fourth Year			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 349		2 MUSC 480	1
MUSC 352		2 MUSC 3XX Band	1
MUSC 355		2 MUSC 483	2
MUSC 357		1 EDUC 489	3
MUSC 358		1 Science & Technology - Gen Ed category S	3
MUSC 385		3 Quantitative Reasoning - Gen Ed category R	3
MUSC 482		2 ENGL 322 (Upper Division Writing Gen Ed - Writing and the Creative Process)	3
MUSC 4XX Applied Study		1	
MUSC 3XX Band		1	
Wellness - Gen Ed category W		2	

17 **16**

Fifth Year			
Fall	Credits		
EVEN YEAR			
EDUC 485		1	

EDUC 487	9
EDUC 488	3
13	

Total Credits: 146

Sample Program Guide

vocal music education

9 Semester Plan of Study for Students entering in ODD Fall.

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 112 or 111		1 MUSC 103 (Gen Ed category A)	3
MUSC 130		3 MUSC 131	3
MUSC 132		1 MUSC 133	1
MUSC 160		1 MUSC 161	1
MUSC 167		1 MUSC 167	1
MUSC 174		1 MUSC 175	1
MUSC 189		1 MUSC 1XX Choir	1
MUSC 1XX Choir		1 ENGL 120 (Gen Ed category C)	3
ENGL 110 (Gen Ed category C)		3 Wellness - Gen Ed category W	2
COMM 110 (Gen Ed category C)		3	
		16	16

Sophomore			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 112 or 111		1 MUSC 231	3
MUSC 230		3 MUSC 233	1
MUSC 232		1 MUSC 261	1
MUSC 260		1 MUSC 267	1
MUSC 267		1 MUSC 3XX Choir	1
MUSC 3XX Choir		1 MUSC 1XX Minor Ensemble	1
MUSC 353		2 Science & Technology w/Lab - Gen Ed category S	4
EDUC 321		3 PSYC 250 (or take HDFS 230 - either course counts as Gen Ed category B)	3
PSYC 111 (Gen Ed category B)		3 EDUC 322	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		16	18

Junior			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	

MUSC 250	2	MUSC 341	3
MUSC 340	3	MUSC 350	2
MUSC 349	2	MUSC 351	2
MUSC 367	1	MUSC 367	1
MUSC 3XX Choir	1	MUSC 3XX Choir	1
MUSC 481	2	MUSC 3XX Minor Ensemble	1
EDUC 451	3	EDUC 486	3
Science & Technology - Gen Ed category S and category G ^{Select} course that fulfills both categories	3		

17 **13**

Senior			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 332		2 MUSC 359	2
MUSC 352		2 MUSC 480	1
MUSC 355		2 MUSC 483	2
MUSC 385		3 EDUC 489	3
MUSC 467		1 Cultural Diversity - Gen Ed category D	3
MUSC 482		2 Quantitative Reasoning - Gen Ed category R	3
MUSC 3XX Choir		1 Science & Technology - Gen Ed category S	3
ENGL 322 (Upper Division Writing Gen Ed - Writing and the Creative Process)		3	

16 **17**

Fifth Year			
Fall	Credits		
ODD YEAR			
EDUC 485		1	
EDUC 487		9	
EDUC 488		3	

13

Total Credits: 142

9 Semester Plan of Study for Students entering in EVEN Fall.

Freshman			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 130		3 MUSC 103 (Gen Ed category A)	3
MUSC 132		1 MUSC 131	3
MUSC 160		1 MUSC 133	1
MUSC 167		1 MUSC 161	1
MUSC 174		1 MUSC 167	1
MUSC 189		1 MUSC 175	1

MUSC 3XX Choir	1	MUSC 3XX Choir	1
ENGL 110 (Gen Ed category C)	3	ENGL 120 (Gen Ed category C)	3
COMM 110 (Gen Ed category C)	3	Wellness - Gen Ed category W	2
15		16	
Sophomore			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 112 or 111		1 MUSC 112	1
MUSC 230		3 MUSC 231	3
MUSC 232		1 MUSC 233	1
MUSC 260		1 MUSC 261	1
MUSC 267		1 MUSC 267	1
MUSC 3XX Choir		1 MUSC 3XX Choir	1
MUSC 353		2 MUSC 1XX Minor Ensemble	1
EDUC 321		3 EDUC 322	3
PSYC 111 (Gen Ed category B)		3 Science & Technology w/lab - Gen Ed category S	4
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
16		16	
Junior			
Fall	Credits	Spring	Credits
EVEN YEAR		ODD YEAR	
MUSC 180		0 MUSC 341	3
MUSC 250		2 MUSC 351	2
MUSC 340 (Gen Ed category A)		3 MUSC 367	1
MUSC 367		1 MUSC 3XX Choir	1
MUSC 385		3 MUSC 3XX Minor Ensemble	1
MUSC 3XX Choir		1 EDUC 486	3
MUSC 481		2 EDUC 489	3
EDUC 451		3 PSYC 250 (Gen Ed category B)	3
Science & Technology - Gen Ed category S and category G		3	
Select a course that fulfills both categories			
18		17	
Senior			
Fall	Credits	Spring	Credits
ODD YEAR		EVEN YEAR	
MUSC 332		2 MUSC 350	2
MUSC 349		2 MUSC 359	2
MUSC 352		2 MUSC 480	1
MUSC 355		2 MUSC 483	2
MUSC 467		1 Cultural Diversity - Gen Ed category D	3
MUSC 482		2 Quantitative Reasoning - Gen Ed category R	3

MUSC 3XX Choir	1 Science & Technology - Gen Ed category S	3
ENGL 322 (Upper Division Writing Gen Ed - Writing and the Creative Process)	3	
	15	16
Fifth Year		
Fall	Credits	
EVEN YEAR		
EDUC 485	1	
EDUC 487	9	
EDUC 488	3	
	13	

Total Credits: 142

Natural Resources Management

Department Information

- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/ (<http://www.ndsu.edu/snrs/>)
- **Credential Offered:**
B.S., Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/natural-resources-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/natural-resources-management/>)

With increasing human pressure and a growing need to balance competing demands, we need new and better ways to manage our natural resources. The natural resources management (NRM) undergraduate program gives students flexible and powerful options to pursue their studies. Core courses provide a broad foundation in the biological and physical/earth sciences. Students then choose one of six emphases to further their skills and prepare for a variety of careers.

THE PROGRAM

The NRM undergraduate program is offered by the School of Natural Resource Sciences (SNRS) at North Dakota State University (NDSU). We are an interdisciplinary program that focuses on the science and management of natural resources. The program draws upon courses and resources across SNRS, including Entomology, Natural Resource Management, Range Science, and Soil Science, as well as additional programs and colleges across NDSU.

Students in NRM acquire a broad background in natural resources as well as an in-depth study in an area of interest. This exposure to multiple disciplines helps prepare students to find solutions to complex environmental problems. The undergraduate program curriculum is divided into core classes required of all students and an emphasis selected by the individual student from six areas of interest.

NRM Core – This group of courses provides each student a broad foundation while satisfying NDSU's General Education requirements.

NRM Emphasis –NRM offers six emphasis areas, each with their own combination of course requirements and electives. The emphases allow students to choose courses from a diverse group of approved electives.

- **Entomology** - Entomology is the study of insects and how they interact with people and with the environment. This emphasis area provides a strong scientific foundation with a focus on insects, how they are studied, and their management.
- **Environmental Sustainability, Outreach, and Policy** - Focuses on how to deal with environmental and social changes in a sustainable way. The emphasis area prepares students to work on environmental policy and public outreach combined with strategic thinking to predict sustainable paths on pressing environmental issues.

- **Rangeland Ecology** - Focuses on the broad study of native, non-forested ecosystems that cover more than 50% of the earth's land. These areas are managed as natural ecosystems to provide services that can benefit society. This emphasis area will prepare students by covering a variety of ecological topics including wildlife management, grassland restoration, and fire ecology.
- **Rangeland Livestock Production** - Focuses on the management of rangelands and grasslands for optimum livestock production and environmental benefits for society. Students will cover land management fields, the work of agencies and the private sector, as well as ranching operations.
- **Soil Science** - Soil Science is the study of the soil as a component of natural and man-made systems and is the key factor in food production and is at the forefront of environmental and natural resource issues such as land use, soil contamination, ground water quality and waste disposal.
- **Water, Habitat, and Environmental Management** - Focuses in an interdisciplinary way on the environmental management of ecosystems. This emphasis area teaches basic and hands-on principles in the management of water, habitat (animals and plants), and the environment as a whole.

THE FACULTY

Our faculty come from across the School of Natural Resource Sciences and are dedicated to providing quality instruction and advising.

CAREER OPPORTUNITIES

NRM graduates are prepared with the skills and knowledge for facing complex problems in natural resources, agriculture, and the environment. Common career options include natural resources jobs with government agencies at the federal, state, or local level; agricultural, conservation and environmental non-profit organizations, extension and outreach positions, and private sector employment, including consulting in addition to preparation for advanced degrees.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
BIOL 150 & 150L		4 BIOL 151 & 151L	4
ENGL 110		3 ENGL 120	3
NRM 150		1 Hum. & Fine Arts Elective	3
NRM 225		3 MATH 103	3
RNG 136		3 Wellness Gen Ed	2
		14	15
Second Year			
Fall	Credits	Spring	Credits
CHEM 121 & 121L		4 EMGT, POLS, or SOC elective	3
COMM 110		3 SOIL 210	3
ECON 201		3 STAT 330	3
ENT 210		3 Emphasis Core or Elective Credits	6
RNG 213		3	
		16	15
Third Year			
Fall	Credits	Spring	Credits
ENGL 321, 324, or 459		3 NRM 421	3
PHIL 215 or 225		3 RNG 452 or GEOG 455	3
Emphasis Core or Elective Credits		9 Emphasis Core or Elective Credits	9
		15	15

Fourth Year			
Fall	Credits	Spring	Credits
Emphasis Core or Elective Credits		15 NRM 462, RNG 462, or SOIL 462	3
		Emphasis Core or Elective Credits	12
		15	15

Total Credits: 120

Natural Resources Management Emphasis Areas

Entomology

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 450	Invertebrate Zoology	3
BIOL 475	Conservation Biology	3
ENT 350	General Entomology	3
ENT 431	Principles of Insect Pest Management	3
ENT 470	Insect Ecology	3
PLSC 110	World Food Crops	3
RNG 450	Range Plants	3
or BIOL 461	Plant Ecology	
or PLSC 380	Principles of Plant Physiology	
Required 6 additional PLSC/SOIL elective credits		6
Required 15 additional elective credits		15
Total Credits		45

environmental sustainability, outreach, and policy

Code	Title	Credits
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
or HIST 435	World Environmental History	
NRM 401	Urban-Ecosystem Management	3
NRM 420	Sustainable Scenarios in Natural Resources Management	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
200-level or higher POLS, SOC, or EMGT		6
Required 26 additional elective credits		26
Total Credits		50

rangeland ecology

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
BIOL 364	General Ecology	3
BIOL 452	Ichthyology	3
or BIOL 454	Herpetology	
or BIOL 456	Ornithology	
or BIOL 458	Mammalogy	
BIOL 461	Plant Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
or NRM 454	Wetland Resources Management	

PLSC 380	Principles of Plant Physiology	3
RNG 450	Range Plants	3
RNG 451	Ecology of Fire-Dependent Ecosystems	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	
Required 9 additional approved elective credits		9
Total Credits		51

rangeland livestock production

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 357	Animal Genetics	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
PLSC 315	Genetics	3
PLSC 320	Principles of Forage Production	3
PLSC 323	Principles of Weed Science	3
RNG 450	Range Plants	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	
Required 9 additional approved elective credits		9
Total Credits		47

soil science

Code	Title	Credits
CHEM 240	Survey of Organic Chemistry	3
or BIOC 260	Elements of Biochemistry	
or MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
MATH 105	Trigonometry	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production (or 300/400 RNG Elective)	3
PLSC 380	Principles of Plant Physiology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 351	Soil Ecology	3
SOIL 410	Soils and Land Use	3
SOIL 433	Soil Ecohydrology and Physics	3
SOIL 444	Soil Genesis and Survey	3
SOIL/NRM 454	Wetland Resources Management	3

Required 6 additional approved elective credits	6
Total Credits	50

water, habitat, and environmental management

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
or HIST 435	World Environmental History	
NRM 264	Natural Resource Management Systems	3
NRM 402	River and Stream Resource Management	3
or NRM 454	Wetland Resources Management	
or SOIL 410	Soils and Land Use	
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
Required 26 additional approved elective credits		26
Total Credits		50

Natural Resources Management

Department Information

- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/ (<http://www.ndsu.edu/snrs/>)
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/natural-resources-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/natural-resources-management/#planofstudytext>)

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

MAJOR REQUIREMENTS

Code	Title	Credits
Required Core Courses for Natural Resources Management:		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
ECON 201	Principles of Microeconomics (May satisfy general education category B and G)	3
ENGL 321 or ENGL 324 or ENGL 459	Writing in the Technical Professions Writing in the Sciences Researching and Writing Grants and Proposal	3
ENT 210	Insects, Humans and the Environment	3
PHIL 215 or PHIL 225	Contemporary Moral Issues (May satisfy general education category A) Environmental Ethics	3
MATH 103	College Algebra	3
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 421	Environmental Outreach Methods	3
NRM/RNG/SOIL 462	Natural Resource and Rangeland Planning	3
RNG 136	Introduction to Range Management	3
RNG 213	Rangeland Sampling Techniques	3
RNG 452 or GEOG 455	Managing Natural and Rangeland Resources using GIS Introduction to Geographic Information Systems	3
EMGT, POLS, or SOC Elective		3
SOIL 210	Introduction to Soil Science	3
STAT 330	Introductory Statistics	3
Emphasis: Students must select one of the NRM emphasis areas listed below to complete the major requirements.		45-50
Total Credits		100-105

NATURAL RESOURCES MANAGEMENT EMPHASIS AREAS

- Declaring an Emphasis- Students should formally declare an emphasis area with the **Office of Registration & Records** no later than the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Water, Habitat, and Environmental Management Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
BIOL 475 or BIOL 476	Conservation Biology Wildlife Ecology and Management	3
ECON 481	Natural Resource Economics	3
HIST 434 or HIST 435	Environmental History World Environmental History	3
NRM 264	Natural Resource Management Systems	3
NRM 402 or NRM 454 or SOIL 410	River and Stream Resource Management Wetland Resources Management Soils and Land Use	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
Select a minimum of 26 credits from the approved electives below:		26
BIOL 359	Evolution	
BIOL 414	Plant Systematics	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 461	Plant Ecology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 472	Structure and Diversity of Plants and Fungi	
BIOL 477	Wildlife and Fisheries Management Techniques	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
ENT 350	General Entomology	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
NRM 401	Urban-Ecosystem Management	
NRM 420	Sustainable Scenarios in Natural Resources Management	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 315	Genetics	
PLSC 315L	Genetics Laboratory	
PLSC 323	Principles of Weed Science	
PLSC 355	Woody Landscape Plants	
RNG 451	Ecology of Fire-Dependent Ecosystems	
RNG 456	Ecological Restoration	
RNG 458	Grazing Ecology	
RNG 450	Range Plants	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	

SOIL 444	Soil Genesis and Survey	
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Total Credits		50
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Environmental Sustainability, Outreach, and Policy Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
or HIST 435	World Environmental History	
NRM 401	Urban-Ecosystem Management	3
NRM 420	Sustainable Scenarios in Natural Resources Management	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
POLS, SOC or EMGT	200 level or higher	6
Select a minimum of 26 credits from the approved electives listed below:		26
BIOL 461	Plant Ecology	
COMM 112	Understanding Media and Social Change	
COMM 133	Introduction to Agricultural Communication	
COMM 316	Conflict Communication	
ECON 482	Environmental Economics	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 481	Disaster Analysis	
ENT 350	General Entomology	
GEOL 201	Climate Change and Energy	
GEOL 219	Oceanography	
GEOL 300	Environmental Geology	
GEOL 412	Geomorphology	
GEOL 414	Hydrogeology	
GEOL 460	Biogeochemistry	
GEOG 470	Remote Sensing	
NRM 322	Environmental Law and Policy	
NRM 453	Rangeland Resources Watershed Management	
PLSC 110	World Food Crops	
PLSC 219	Introduction to Prairie & Community Forestry	
POLS 115	American Government	
POLS 215	Problems and Policies In American Government	
POLS 442	Global Policy Issues	
RNG 451	Ecology of Fire-Dependent Ecosystems	
RNG 456	Ecological Restoration	
RNG 458	Grazing Ecology	
SOC 110	Introduction to Sociology	
SOC 115	Social Problems	
SOC 340	Social Research Methods	
SOC 404	Community Assessment	
SOC 405	Community Development	
SOC 235	Cultural Diversity	
SOC 431	Environmental Sociology	
SOC 439	Social Change	

SOC 443	International Disasters
SOIL 217	Introduction to Meteorology & Climatology
AGEC 347	Principles of Real Estate
AGEC 242	Introduction to Agricultural Management
AGEC 375	Applied Agricultural Law
AGEC 452	Food Laws & Regulations
AGEC 474	Cooperatives
MATH 144	Mathematics for Business
ECON 202	Principles of Macroeconomics
ECON 341	Intermediate Microeconomics
ECON 470	Public Economics
GEOL 465	Remote Sensing of the Environment

Total Credits**50*****Rangeland Ecology Emphasis***

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
BIOL 364	General Ecology	3
BIOL 452	Ichthyology	3
or BIOL 454	Herpetology	
or BIOL 456	Ornithology	
or BIOL 458	Mammalogy	
BIOL 461	Plant Ecology	3
BIOL 475	Conservation Biology	3
or BIOL 476	Wildlife Ecology and Management	
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 453	Rangeland Resources Watershed Management	3
or NRM 454	Wetland Resources Management	
PLSC 380	Principles of Plant Physiology	3
RNG 450	Range Plants	3
RNG 451	Ecology of Fire-Dependent Ecosystems	3
RNG 456	Ecological Restoration	3
RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	

Select a minimum of 9 additional credits of 300 or 400 level courses from ENT, SOIL, RNG, or NRM:

9

Total Credits**51*****Rangeland Livestock Production Emphasis***

Code	Title	Credits
ANSC 114	Introduction to Animal Sciences	3
ANSC 220	Livestock Production	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 357	Animal Genetics	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
PLSC 315	Genetics	3
PLSC 320	Principles of Forage Production	3
PLSC 323	Principles of Weed Science	3
RNG 450	Range Plants	3
RNG 456	Ecological Restoration	3

RNG 458	Grazing Ecology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 351	Soil Ecology	3
or SOIL 410	Soils and Land Use	
or SOIL 444	Soil Genesis and Survey	
Select a minimum of 9 additional credits of 300 or 400 level courses from ENT, SOIL, RNG, or NRM		9

Total Credits	47
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Soil Science Emphasis

Code	Title	Credits
CHEM 240	Survey of Organic Chemistry	3
or BIOC 260	Elements of Biochemistry	
or MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
MATH 105	Trigonometry	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PLSC 110	World Food Crops	3
PLSC 225	Principles of Crop Production (or 300/400 level Range Sciences Course)	3
PLSC 380	Principles of Plant Physiology	3
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 351	Soil Ecology	3
SOIL 410	Soils and Land Use	3
SOIL 433	Soil Ecohydrology and Physics	3
SOIL 444	Soil Genesis and Survey	3
SOIL/NRM 454	Wetland Resources Management	3
Select a minimum of 6 additional credits of 300 or 400 level classes from PLSC, RNG, NRM, ENT, PPTH, ABEN, or ASM		6

Total Credits	50
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Entomology Emphasis

Code	Title	Credits
BIOL 364	General Ecology	3
RNG 450	Range Plants	3
or BIOL 461	Plant Ecology	
or PLSC 380	Principles of Plant Physiology	
BIOL 450	Invertebrate Zoology	3
BIOL 475	Conservation Biology	3
ENT 350	General Entomology	3
ENT 431	Principles of Insect Pest Management	3
ENT 470	Insect Ecology	3
PLSC 110	World Food Crops	3
Select a minimum of 6 credits of approved electives from below:		6

PLSC 210	Horticulture Science
PLSC 219	Introduction to Prairie & Community Forestry
PLSC 315	Genetics
PLSC 323	Principles of Weed Science
PLSC 350	Sugarbeet Production
PLSC 355	Woody Landscape Plants
PLSC 365	Herbaceous Landscape Plants
PLSC 370	Landscape Management

PLSC 375	Turfgrass Management	
PLSC 412	Nursery Production and Management	
PLSC 415	Vegetable Crop Production	
PLSC 416	Fruit Crop Production	
PLSC 422	Greenhouse Production and Management	
PLSC 425	Potato Science	
PLSC 431	Intermediate Genetics	
PLSC 433	Weed Biology and Ecology	
PLSC 455	Cropping Systems:An Integrated Approach	
SOIL 351	Soil Ecology	
Select a minimum of 15 credits from the approved electives listed below:		15
BIOL 359	Evolution	
BIOL 463	Animal Behavior	
BIOL 476	Wildlife Ecology and Management	
MICR 202	Introductory Microbiology	
MICR 452	Microbial Ecology	
MICR 463	Clinical Parasitology	
NRM 401	Urban-Ecosystem Management	
NRM 402	River and Stream Resource Management	
NRM 420	Sustainable Scenarios in Natural Resources Management	
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	
NRM 453	Rangeland Resources Watershed Management	
NRM 454	Wetland Resources Management	
PLSC 315	Genetics	
PPTH 324	Introductory Plant Pathology	
PPTH 454	Diseases Of Field and Forage Crops	
PPTH 455	Plant Disease Management	
PPTH 457	Landscape Plant Pathology	
PPTH 460	Fungal Biology	
RNG 450	Range Plants	
SOIL 410	Soils and Land Use	
Total Credits		45

Degree Requirements

- **Acceptable Substitutions:** For the Water, Habitat, and Environmental Management; Environmental Sustainability, Outreach, and Policy; and Entomology emphasis areas there is a list of recommended emphasis electives: **All other substitutions require advisor approval and a substitution form to be completed and submitted to the** Office of Registration and Records (<https://www.ndsu.edu/registrar/>). Emphasis area courses may not be double-counted with the NRM core classes; a maximum of 3 credits of Field Experience (396/496) or Co-op Ed (397/497) may be counted as emphasis electives.
- Students electing to complete this major in the College of Science and Mathematics do not have to complete the 6 credits of humanities or social sciences College of Science and Mathematics requirements.

Minor Requirements

Minor: Natural Resources Management

Required Credits: 18

Code	Title	Credits
Core Course		
NRM 225	Natural Resources & Agrosystems	3
Interdisciplinary Courses: Select 5 of the following:		15
BIOL 364	General Ecology	
BIOL 476	Wildlife Ecology and Management	
ECON 481	Natural Resource Economics	

EMGT 261	Disaster Preparedness
EMGT 262	Disaster Mitigation
ENT 350	General Entomology
GEOL 105	Physical Geology
GEOL 300	Environmental Geology
HIST 434	Environmental History
HIST 435	World Environmental History
NRM 264	Natural Resource Management Systems
NRM 401	Urban-Ecosystem Management
NRM 402	River and Stream Resource Management
NRM 420	Sustainable Scenarios in Natural Resources Management
NRM 421	Environmental Outreach Methods
NRM 431	National Environmental Policy Act & Environmental Impact Assessment
NRM/RNG 453	Rangeland Resources Watershed Management
NRM 454	Wetland Resources Management
NRM 456	Ecological Restoration
RNG 136	Introduction to Range Management
RNG 450	Range Plants
RNG 451	Ecology of Fire-Dependent Ecosystems
RNG 458	Grazing Ecology
SOC 405	Community Development
SOC 431	Environmental Sociology
SOIL 210	Introduction to Soil Science
SOIL 351	Soil Ecology
SOIL 410	Soils and Land Use
SOIL 433	Soil Ecohydrology and Physics

Minor Requirements and Notes:

- Students must earn a 2.00 minimum GPA in the courses used to satisfy the minor requirements.
- A minimum of 8 credits must be taken at NDSU.

Neuroscience

Department Information

- **Department Location:**
Minard Hall 232
- **Department Phone:**
701-231-8622
- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/neuroscience/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/neuroscience/>)

Neuroscience is a rapidly expanding field and an undergraduate minor will benefit students studying in many scientific disciplines (e.g., biology; zoology; psychology; chemistry), pre-professional and professional areas (e.g., exercise science; nursing; pharmacy), as well as in the humanities and social sciences. Students learn how the brain and nervous system receives and processes a variety of external and internal information to generate a variety of conscious and unconscious behaviors. Moreover, with an inherent emphasis on critical thinking, a neuroscience minor provides a valuable check on magical or mystical thinking about the human condition. The neuroscience minor may increase students' opportunities either to attend graduate school or to find positions in their professional field.

Courses taken for a Psychology major cannot be used toward a Neuroscience minor. Be sure to officially declare your minor with the Office of Registration and Records (<https://www.ndsu.edu/registrar/>) by completing the Minor/Advisor Change Form (<https://www.ndsu.edu/registrar/forms/>) which is found online.

Neuroscience

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8622
- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/neuroscience/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/neuroscience/>)

Minor Requirements

Minor: Neuroscience

Required Credits: 17

Code	Title	Credits
Required Courses		
PSYC 260	Introduction to Neuroscience	3
Electives: Select 14 credits from the following:		14
BIOL 220	Human Anatomy and Physiology I	
BIOL 220L	Human Anatomy and Physiology I Laboratory	
PSYC 322	Judgment & Decision-Making	
PSYC 450	Computational Methods in Experimental Psychology	
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
PSYC 493	Undergraduate Research (no more than 6 credits)	
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Psychology Majors: Classes taken for the psychology major cannot be double-counted with the neuroscience minor. The credits must be unique from courses used to fulfill the psychology major.

Nursing

Department Information

- **Department Location:**
SGC D102
- **Department Phone:**
701-231-7395
- **Department Web Site:**
www.ndsu.edu/nursing/ (<http://www.ndsu.edu/nursing/>)
- **Credential Offered:**

B.S.N.

• **Plan Of Study Sample:**bulletin.ndsu.edu/programs-study/undergraduate/nursing/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/nursing/>)

Major Requirements

Major: Nursing - Pre-Licensure Track

Degree Type: B.S.N.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

All students must complete all major requirements with a grade of 'C' or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S) [*]	4
BIOL 221 & 221L	Human Anatomy and Physiology II	4

CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S) *	4
CHP 190	Critical Thinking and Academic Success ¹	2
CHP 400	Interprofessional Health Care Practice	3
ENGL 325	Writing in the Health Professions (May satisfy a general education category C)	3
HNES 250	Nutrition Science (May satisfy a general education category W)	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy a general education category S) *	3
NURS 210	Orientation to Research and Evidence-Based Practice	2
NURS 250	Health Promotion	2
NURS 251	Skills and Concepts for Nursing	2
NURS 252	Gerontologic Nursing	2
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I	4
NURS 360	Health Assessment	4
NURS 362	Family Nursing II	4
NURS 382	Clinical Applications	1
NURS 402	Mental Health Nursing	4
NURS 403	Adult Health Nursing II	5
NURS 404	Adult Health III	4
NURS 406	Community & Public Health Nursing	4
NURS 410	Research and Redesign	2
NURS 450	Nursing Synthesis/Practicum	4
NURS 460	Management, Leadership and Career Development	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B) *	3
PSYC 250	Developmental Psychology	3
SOC 110 or ANTH 111	Introduction to Sociology (May satisfy a general education category B) * Introduction to Anthropology	3
Total Credits		98

* Will be used in the selective GPA calculation for admission to the Professional Nursing program. Grades for three of the five sciences (lecture/lab) will be used for selective GPA.

¹ CHP 190 is required for students with fewer than 24 earned transfer credits.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- Would also accept the following course sequence in place of CHEM 117 Chemical Concepts and Applications/CHEM 117L Chem Concepts and Applications Lab: CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory, CHEM 122 General Chemistry II/CHEM 122L General Chemistry II Laboratory or CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory and CHEM 140 Organic Chemical Concepts and Applications.
- Would also accept the following course sequence in place of Psychology 250: HDFS 230, HDFS 320, and HDFS 340.

Major Requirements

Major: Nursing - LPN to BSN Track

Degree Type: B.S.N.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.

4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

All students must complete all major requirements with a grade of 'C' or better including ENGL 120 and COMM 110.

Code	Title	Credits
Nursing Major Requirements		
BIOC 260	Elements of Biochemistry	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S)	4
HNES 250	Nutrition Science (May satisfy a general education category W) *	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy a general education category S) *	3
NURS 251	Skills and Concepts for Nursing	2
NURS 252	Gerontologic Nursing	2
NURS 300	Pharmacology & Pathophysiology for Nursing	4
NURS 289	Transition from Associate LPN to BSN	2
NURS 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I (validation)	4
NURS 360	Health Assessment	4
NURS 362	Family Nursing II (validation)	4

NURS 372	Expanded Family Nursing I	2
NURS 374	Expanded Family Nursing II	2
NURS 402	Mental Health Nursing (validation)	4
NURS 403	Adult Health Nursing II (validation)	5
NURS 405	Psychosocial Nursing	2
NURS 406	Community & Public Health Nursing	4
NURS 407	Adult Health: Complex Problems	3
NURS 407L	Expanded Clinical Practice for the LPN-BSN	3
NURS 450	Nursing Synthesis/Practicum	4
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 460	Management, Leadership and Career Development	3
CHP 400	Interprofessional Health Care Practice	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B)	3
PSYC 250	Developmental Psychology *	3
SOC 110 or ANTH 111	Introduction to Sociology (May satisfy a general education category B) *	3
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		102

* Will be used in the selective GPA calculation for admission to the Professional Nursing program.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- Would also accept the following course sequence in place of CHEM 117 Chemical Concepts and Applications/CHEM 117L Chem Concepts and Applications Lab: CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory, CHEM 122 General Chemistry II/CHEM 122L General Chemistry II Laboratory or CHEM 121 General Chemistry I/CHEM 121L General Chemistry I Laboratory and CHEM 140 Organic Chemical Concepts and Applications.

Major Requirements

Major: Nursing - RN to BSN Track

Degree Type: B.S.N.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

- Satisfactory completion of all requirements of the curriculum in which one is enrolled.
- Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
- Satisfactory completion of the general education requirements as specified by the university.
- A minimum institutional GPA of 2.00 based on work taken at NDSU.
- At least 36 credits presented for graduation must be in courses numbered 300 or higher.
- Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
- At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Demonstrated Competency Credit (see notes below)		
Nursing Major Requirements		
NURS 326	Immersion I	1
NURS 336	Transcultural Nursing Care	3
NURS 346	NDSU RN to BSN Immersion II	1
NURS 356	The Essence of Nursing	3
NURS 366	Quality and Safety in Nursing	3
NURS 386	Chronicity Throughout the Lifespan I	3
NURS 388	Chronicity Throughout the Lifespan II	3
NURS 420	Evidence-Based Practice and Research in Nursing	3
NURS 426	NDSU RN to BSN Immersion III	1
NURS 446	Population Focused Nursing Care	3
NURS 446L	Population Focused Nursing Care - Clinical	1
NURS 456	RN to BSN Immersion IV	1
NURS 462	Nurses as Leaders	3
NURS 462L	Nursing Leadership Practicum	1
NURS 478	BSN Capstone	3
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		36

Requirements and Degree Notes:

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Health Professions (CoHP). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoHP.
- Courses will be offered in 8 week blocks
- 60 credits toward degree must be earned from a four-year degree granting institution
- 36 credits must be earned in residence at NDSU
- 18 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Applied Science Degree
- 25 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Science Degree

Nursing

Department Information

- **Department Location:**
SGC D102
- **Department Phone:**
701-231-7395
- **Department Web Site:**
www.ndsu.edu/nursing/ (<http://www.ndsu.edu/nursing/>)
- **Credential Offered:**
B.S.N.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/nursing/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/nursing/>)

North Dakota State University offers a Bachelor of Science in Nursing (BSN) degree. The professional program is offered at the NDSU Fargo site and NDSU Nursing at Sanford Health in Bismarck. Graduates are eligible to apply for the national licensing examination (NCLEX) to become a registered nurse (RN). The program is fully accredited by the Commission of Collegiate Nursing Education and approved by the North Dakota Board of Nursing.

The Program

The mission of the School of Nursing is to advance nursing knowledge and develop dynamic nurse leaders who improve the health of all people, emphasizing underserved, rural, and diverse populations. The nursing curriculum prepares professional nurses by providing a sound educational base for practice, graduate study, professional development, and professional and civic responsibility. The nursing program serves as a resource for society through consultation, collaboration, advocacy and scholarship.

Career Opportunities

Rapid changes in health care and technology require the nursing profession to continually expand its role. Employment forecasts predict an increasing demand for professional nurses. Career opportunities for a nurse with a BSN include positions in hospitals, schools, community agencies, the military, insurance companies, nursing homes, clinics, businesses and research settings. Graduates are prepared to work in a variety of settings that demand critical thinking, autonomy, collaboration, and accountability. A four-year BSN degree offers an array of career options and opportunities for career advancement.

Extra-Curricular Activities

Numerous active student organizations are available at NDSU, including Student Nurses Association chapters in Bismarck and Fargo. Nursing students are strongly encouraged to participate in campus activities because they provide opportunities for teamwork, leadership, service and enjoyment.

Scholarships

Information on scholarships for students admitted to the major is available from the Office of Financial Aid and Scholarships and the School of Nursing. Information on first year or transfer student scholarships is available from the Office of Admission.

The Faculty and Facilities

The NDSU BSN program is offered at two locations: the NDSU Fargo site and NDSU Nursing at Sanford Health in Bismarck. At the NDSU Fargo site, students will find faculty offices and state-of-the art, hands-on nursing education labs in the six-story Aldevron Tower. Additional classrooms are found in Sudro Hall, connected to Aldevron Tower. In Bismarck, the School of Nursing is conveniently located across the street from Sanford Health. The School houses faculty offices, classrooms, and fully equipped skills and health assessment labs, as well as an advanced simulation center to enhance student learning. The Fargo-Moorhead and Bismarck communities provide a rich source of health care facilities, which are utilized by the nursing program. The faculty members are experts in specialized clinical practice areas and assist students with learning in the classroom, laboratory, and clinical settings.

Advising

The School of Nursing is part of the College of Health Professions. Pre-nursing advising is available for all students prior to acceptance into the professional program. Each nursing student admitted to the professional program is assigned a nursing faculty advisor who is available for academic guidance, assistance, and career planning. Students are strongly encouraged to seek the assistance of their advisor early in their plan of study and maintain contact on a regular basis.

Transfer

The pre-professional courses may be completed at NDSU or at another regionally accredited college or university. Transfer students are encouraged to contact a pre-nursing advisor early to discuss course selection and transferability. The pre-licensure professional program, which takes three years to complete, must be taken in sequence and cannot be accelerated due to clinical placements. The LPN-BSN and RN-BSN program, which will take two years to complete, must be taken in sequence and cannot be accelerated.

Admission to the Pre-Licensure Program

Direct Admission

Direct admission is offered to high school seniors who have demonstrated exemplary academic performance. Direct admission is available at both the Bismarck and Fargo site. Applications are due February 1st. If offered direct admission, students will complete the freshman year prerequisite courses. Students must maintain established progression criteria during their first year coursework. If program criteria is met, students begin the professional nursing program in their second year. Students not admitted through direct admission, or who do not maintain progression requirements, can apply through the standard admission process. Additional information as well as the admission application can be found at https://www.ndsu.edu/nursing/degrees/pre_licensure_bsn_track/direct_admin/.

Standard Admission

The School of Nursing in Bismarck accepts applications and admits students for both fall and spring semesters. On the Fargo campus, applications are accepted once per year for students starting the program in both fall and spring. To be eligible for application, students must meet the following requirements: 1) a minimum cumulative grade point average (GPA) of 2.75* on all college level work, and 2) completion of the prerequisite courses with a grade of "C" or higher. The application deadlines and online application are posted on the School of Nursing website (www.ndsu.edu/nursing/pre_licensure_bsn_track/ (http://www.ndsu.edu/nursing/pre_licensure_bsn_track/)). Admission is competitive and involves a holistic review process. The holistic review considers a student's life experiences, personal qualities, and attributes, as well as traditional measures such as GPA. Students are encouraged to consult with the pre-nursing advisor at their preferred site prior to the application deadline. **Because of limitations on class size, the typical student admitted to the nursing program has a selective GPA higher than 2.75.*

Selected Prerequisite Courses

The selected GPA is calculated based on grades in the following prerequisite courses. (Applicants may have prerequisite courses in progress at the time of application.)

- Communication 110: Fundamentals of Public Speaking
- English 120: College Composition II
- Psychology 111: Introduction to Psychology
- Sociology 110: Introduction to Sociology or Anthropology 111: Introduction to Anthropology

A minimum of 8 credits in the science category (preference will be given to those students who have completed 11 credits or more.)

- Biology 220/220L: Human Anatomy and Physiology I/Lab
- Biology 221/ 221L: Human Anatomy and Physiology II/Lab
- Biochemistry 260: Elements of Biochemistry
- Chemistry 117/117L: Chemistry Concepts and Applications/Lab
- Microbiology 202/202L: Introductory Microbiology/Lab

Note:

- Students should consult their faculty advisor for electives to enhance their program of study and to meet graduation requirements.
- Computer proficiency is expected before beginning the nursing major.
- Disclaimer: The recommended curriculum is subject to change based on nursing program development. Students must consult with their nursing advisor to facilitate progression in the program.

Advancing to a BSN from a LPN or RN

NDSU offers two tracks for nurses who are licensed as either a licensed practical nurse (LPN) or a registered nurse (RN).

The NDSU School of Nursing offers individual, personalized advising to all students prior to and once accepted in the professional programs. NDSU accepts courses from Regional Accredited Colleges and Universities.

LPN to BSN:

The LPN to BSN program is designed for a licensed practical nurse (LPN) seeking to obtain a Bachelor of Science in Nursing. Graduates are then eligible to apply for the national council licensure examination (NCLEX) to become a registered nurse (RN). Coursework in the professional program is completed on a part-time basis (6 nursing credits a semester) over the length of two years (including summers). Courses are delivered online with clinical work completed in a variety of Fargo locations during the summer semesters. The curriculum builds on students' prior knowledge to develop critical thinking, theoretical knowledge, leadership, and growth in the RN professional role.

Admission Requirements for LPN-BSN

1. Completion of the NLN NACE II (RN-BSN) Exams in the areas of Adult Health, Mental Health, Care of the Child, Care of the Client during Childbearing is required prior to applying to the professional program.
2. Admission to NDSU (it is recommended the application be submitted by Sept. 1st for spring start). Note: Admission to NDSU is not required to complete the validation exams (NACE II exams).
3. Completed Application, which is sent to students after passing all 4 NACE II exams. Application deadline: Oct. 15th.
4. Professional Nursing Program Requirements
 - a. NLN NACE II exams must be completed with passing score prior to applying to the professional program.
 - b. Graduate with a Diploma or Certificate in Nursing or an Associate of Applied Science in Nursing.
 - c. Cumulative GPA of a 2.75 or greater and a Nursing GPA of 3.0 or greater.
 - d. The completion of the following courses with a "C" or higher:
 - Biology 220/2201 & 221/2211: Anatomy and Physiology I and II with lab
 - Microbiology 202/202L: Introduction to Microbiology
 - English 120: College Composition II
 - Communications 110: Fundamentals of Public Speaking
 - Psychology 250: Developmental Psychology
 - Sociology 110: Introduction to Sociology
5. Current unencumbered nursing license as a Licensed Practical Nurse or must be able to obtain license by May and will be admitted on probation pending licensure.

RN TO BSN:

The RN to BSN program is designed for registered nurses who want to advance to a Bachelor of Science in Nursing. The two year one hundred percent online program is geared for part-time students. Coursework focuses on the current health care system/environment, quality and safety, evidence-based practice, population-focused nursing, leadership and chronic health issues. The program is intended to educate nurses to practice with a transformed perspective, having a better understanding of themselves and the complex environment in which nurse's work.

Admission Requirements for RN-BSN

1. Admission to NDSU.
2. Completion of an associate degree in nursing or an associate of applied science degree in nursing.
3. Current unencumbered nurse license (RN).
4. Cumulative GPA of 2.75.
5. Transcripts from all post-secondary schools attended.
6. Completed School of Nursing application including personal statement and background check.
7. Interview upon request.

Demonstrated Competency Credits for RN-BSN

- 18 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Applied Science Degree.
- 25 demonstrated competency credits will be awarded upon completion of the first semester to students who have earned an Associates of Science Degree.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Plan of Study: Pre-Licensure Fall Start Professional Program

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
CHEM 117		3 BIOC 260	4
CHEM 117L		1 COMM 110	3
SOC 110 or ANTH 111		3 PSYC 111	3
CHP 190		2 MICR 202	2
Quantitative Reasoning		3 MICR 202L	1
		15	16
Sophomore			
Fall	Credits	Spring	Credits
BIOL 220		3 BIOL 221	3
BIOL 220L		1 BIOL 221L	1
PSYC 250		3 HNES 250	3
NURS 210		2 NURS 251	2
NURS 250		2 NURS 252	2
Cultural Diveristy (D) Elective		3 NURS 360	4
		14	15
Junior			
Fall	Credits	Spring	Credits
ENGL 325		3 NURS 352	4
NURS 341		3 NURS 362	4
NURS 342		5 NURS 382	1
NURS 300		4 CHP 400	3
		Global Persepective (G)	3
		15	15
Senior			
Fall	Credits	Spring	Credits
NURS 402		4 NURS 404	4
NURS 403		5 NURS 406	4
NURS 410		2 NURS 450	4
NURS 460		3 Humanities & Fine Arts (A)	3
Humanities & Fine Arts (A)		3	
		17	15

Total Credits: 122**Pre-Licensure Spring Start Professional Program**

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
CHEM 117		3 COMM 110	3
CHEM 117L		1 MICR 202	2
SOC 110 or ANTH 111		3 MICR 202L	1
Quantitative Reasoning		3 PSYC 111	3

CHP 190	2	BIOC 260	4
15		16	
Second Year			
Fall	Credits	Spring	Credits
BIOL 220		3 NURS 210	2
BIOL 220L		1 NURS 250	2
PSYC 250		3 BIOL 221	3
Elective		3 BIOL 221L	1
Cultural Diversity (D)		3 HNES 250	3
		Humanities & Fine Arts (A)	3
13		14	
Third Year			
Fall	Credits	Spring	Credits
NURS 251		2 ENGL 325	3
NURS 252		2 NURS 341	3
NURS 360		4 NURS 342	5
Humanities & Fine Arts (A)		3 NURS 300	4
Global Perspective (G)		3	
14		15	
Fourth Year			
Fall	Credits	Spring	Credits
NURS 352		4 NURS 402	4
NURS 362		4 NURS 403	5
NURS 382		1 NURS 410	2
NURS 460		3 CHP 400	3
12		14	
Fifth Year			
Fall	Credits		
NURS 404		4	
NURS 406		4	
NURS 450		4	
12			

Total Credits: 125

Sample Program Guide

LPN to BSN Program

- PN Program Transfer Credits = 40-60 credits
- Total Credits for a degree must = 120
- 60 credits toward degree must be earned from a four-year degree granting institution
- Nursing Validation (17 credits): NURS 362 Family Nursing II, NURS 352 Family Nursing I, NURS 402 Mental Health Nursing, NURS 403 Adult Health Nursing II

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Third Year					
Fall	Credits	Spring	Credits	Summer	Credits
CHEM 117		3 NURS 289		2 NURS 406	4
CHEM 117L		1 NURS 360		4 ENGL 325	3
		BIOC 260		4 NURS 420	3
		4		10	10
Fourth Year					
Fall	Credits	Spring	Credits	Summer	Credits
NURS 372		2 NURS 407		3 NURS 407L	3
NURS 374		2 NURS 460		3 CHP 400	3
NURS 405		2		Global Perspective (G)	
PSYC 111		3			
		9		6	6
Fifth Year					
Fall	Credits				
NURS 450		4			
		4			

Total Credits: 49

Sample Program Guide

RN to BSN Program

- Total Credits for a degree = 120
- RN Program Transfer Credits = approximately 60 credits
- 60 credits toward degree must be earned from a four-year degree granting institution
 - Competency credits will count toward this requirement
- Demonstrated Competency Credits = 18 with an earned Associates of Applied Science **OR** 25 with an Associate of Science

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year					
Fall	Credits	Spring	Credits	Summer	Credits
NURS 326		1 NURS 346		1 NURS 366	3
NURS 356		3 NURS 386		3	
NURS 420		3 NURS 388		3	
		7		7	3
Second Year					
Fall	Credits	Spring	Credits		
NURS 426		1 NURS 456		1	
NURS 436		3 NURS 462		3	
NURS 446		3 NURS 462L		1	
NURS 446L		1 NURS 478		3	
		8		8	

Total Credits: 33

Pharmacy

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-7456
- **Department Web Site:**
www.ndsu.edu/pharmacy/ (<http://www.ndsu.edu/pharmacy/>)
- **Credential Offered:**
Pharm.D.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/pharmacy/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/pharmacy/>)

The pharmacist is one of the most accessible members of today's health care team. More than 200 million people—nearly two-thirds of our entire population—pass through America's pharmacies each week. At more than 50,000 locations, for most hours of the day, pharmacists are ready to serve the public and address their complete pharmaceutical care needs. The pharmacist traditionally has been the first source of advice and assistance for many health concerns. Today, pharmacists are assuming more responsibility in attempting to better meet the health care needs of society.

The Program

The North Dakota State University College of Health Professions, and its School of Pharmacy, houses one of more than 130 schools fully accredited by the Accreditation Council for Pharmacy Education (ACPE). The School of Pharmacy offers a six-year professional degree program leading to the Doctor of Pharmacy (Pharm.D.). The School of Pharmacy is a member of the American Association of Colleges of Pharmacy.

Pharmaceutical Care

The profession of pharmacy has embraced a practice philosophy called pharmaceutical care. Specifically, pharmaceutical care is defined as commitment of the pharmacist to design, implement and monitor patient drug therapy for the purpose of achieving optimal therapeutic outcomes with the ultimate goal of improving the patient's quality of life.

The NDSU School of Pharmacy has developed an emphasis of pharmaceutical care within its curriculum and strives to prepare pharmacy students for their future practices in delivering this contemporary practice philosophy. The curriculum develops skills in pharmaceutical care and emphasizes critical thinking, communication skills, awareness of ethical and social responsibilities, and lifelong self-learning ability.

Career Preparation

Pharmacists today are responsible for ensuring the rational, safe and cost-effective use of drugs. Pharmacist duties include: participating in the drug use decision-making process, establishing therapeutic goals for each patient, selecting the appropriate drug dosage form, selecting the drug product source of supply, determining the dose dosage schedule, preparing the drug product for patient use, providing the drug product and drug information to the patient, monitoring the patient to maximize compliance, monitoring the patient to detect adverse drug reactions and drug interactions, and monitoring the patient's progress to improve therapeutic outcomes.

Numerous drug therapy problems are recognized and corrected by pharmacists in their practices. Pharmacists work closely with the prescriber and patient to ensure proper and safe use of medications.

The current professional pharmacy curriculum fully integrates classroom and experiential learning. All pharmacy students participate in experiential learning (introductory pharmacy practice experiences) and in the Thrifty White Concept Pharmacy each year. The Thrifty White Concept Pharmacy Laboratory is a state-of-the-art model pharmacy that allows students to experience all aspects of pharmacy practice in a real-life environment.

Career Opportunities

Employment of pharmacists within the region remains strong and is expected to grow at a steady pace over the next decade. There has been an increased demand for pharmaceutical services by the public as the population ages and as more potent, costly and high risk drugs enter the marketplace. Approximately 60 percent of pharmacists practice in community pharmacies with the remainder employed as hospital pharmacists, managed care specialists, home health care providers, nursing home consultants, research and product development scientists, and teachers in colleges and universities. According to the U.S. Department of Labor Bureau of Labor Statistics (<https://www.bls.gov/ooh/healthcare/pharmacists.htm>), the median salary in 2018 for pharmacists was \$126,120.

Selective Admission

NDSU's pharmacy program consists of two phases, a pre-pharmacy phase and a professional pharmacy phase. The professional program limits enrollment to 85 new students per class. Students may qualify for admission via one of four different paths.

Option 1: The Early Admission Pathway (<https://workspaces.ndsu.edu/?id=169686>)

The Early Admission Pathway (EAP) to NDSU's PharmD program is designed for academically qualified high school students who want an affordable, expedited path to a PharmD degree. If you are interested in EAP, you would apply during your senior year in high school.

Option 2: The Traditional Admissions Pathway (<https://workspaces.ndsu.edu/?id=166559>)

The Traditional Admissions Pathway involves you entering the program as an undergraduate in pre-pharmacy upon meeting general admission standards of the university. Once all required pre-pharmacy coursework is satisfied, you can apply to the PharmD program. The pre-pharmacy course work may be completed at other institutions and NDSU reviews transfer records submitted and determine if equivalent to NDSU requirements.

You are admitted to the final four professional years on a competitive basis after meeting specific admission requirements of the college which can be found on the Traditional Pathway page (<https://workspaces.ndsu.edu/?id=166559>). Students attending other institutions must maintain frequent contact with the college to determine appropriate course work.

The college is a member of the American Association of Colleges of Pharmacy, and is accredited by the Accreditation Council for Pharmacy Education (ACPE).

Option 3: The Post-Baccalaureate Pathway (New) (<https://workspaces.ndsu.edu/?id=172000>)

Students who will hold a four-year bachelor degree in a health or STEM field on or before May 2021 are eligible to apply for admission to NDSU's PharmD program through a new, streamlined pathway. The pathway has fewer requirements because many of our admission requirements are implicitly met by students who have completed a bachelor degree in a health or STEM field. If an applicant holds a bachelor degree in a health or STEM field and is missing key pre-requisites, we offer a means to complete those courses in the summer before starting the PharmD program.

Note: the NDSU Pharmacy Program encourages applicants holding a four-year bachelor degree in an array of health or STEM fields, from any accredited college or university that offers four-year bachelor programs. Students who wish to pursue this pathway as an undergraduate major in the College of Health Professions may do so by completing the degree requirements for our Bachelor of Science in Health Services (https://www.ndsu.edu/healthprofessions/degrees_programs/health_services/) program.

Option 4: Pharmacy Technician Pathway (New) (<https://workspaces.ndsu.edu/?id=171998>)

Are you a pharmacy technician who is eligible for pharmacy technician licensure in North Dakota, and who is interested in becoming a pharmacist? If so, this new pathway is designed to provide you with a streamlined pathway to meet the NDSU Pharmacy Program's admission requirements. If you completed a pharmacy technician program at a college or university and received academic credit for your program, all of those credits will count towards meeting our admission requirements.

Differential Tuition

Students in the pharmacy professional program (i.e, the final five years of study for students on the **early admission path**, and the final four years for students on the **traditional admission path**) are assessed a different tuition rate. This differential tuition is assessed to cover the higher costs associated with the program.

Current Curriculum

The curriculum leading to the Pharm.D. degree requires a minimum of six years of study. Approximately 77 semester hours are required in the pre-professional curriculum. The vast majority of required pre-professional courses (listed by name and number) must be completed by the end of spring term prior to admission to the professional program for traditional path students, or for early admission students, the final four years of the professional program. A maximum of six elective credits may be taken during the summer prior to entrance in the professional program.

The four-year professional program is divided into three years of didactic education on campus and one year (40 weeks) of experiential training (advanced pharmacy practice experience) with qualified preceptors at various practice sites. Additional introductory experiential training occurs during the summer sessions following the first and second years of the professional program, as well as during the third professional academic year. A wide variety of experiential rotation offerings are available to students. Students should plan to travel outside the Fargo-Moorhead area to fulfill their experiential program requirements.

Our pharmacy program partners with PioneerRx (<http://www.pioneerRx.com/>), a pharmacy management system, to simulate the functions of today's pharmacies.

Sample Program Guide - Pre-Pharmacy

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

PRE-PHARMACY PROGRAM REQUIREMENTS*

*Plan follows most closely with EAP pathway plan, other pathways may differ slightly

First Year					
Fall	Credits	Spring	Credits	Summer	Credits
BIOL 150		3 BIOL 151		3 Gen Ed Humanities and Fine Arts	3
BIOL 150L		1 BIOL 151L		1	
CHEM 121		3 CHEM 122		3	
CHEM 121L		1 CHEM 122L		1	
ENGL 120		3 COMM 110		3	
MATH 146		4 ECON 201		3	
CHP 190		2 STAT 330		3	
		17		17	3
Second Year					
Fall	Credits	Spring	Credits		
PSCI 300		5 PSCI 301		5	
BIOL 220		3 BIOL 221		3	
BIOL 220L		1 BIOL 221L		1	
MICR 350		3 PHRM 324 or ENGL 324		3	
MICR 350L		2 PHYS 211		3	
Gen Ed Social/Behavioral Sci and Cultural Diversity		3 Gen Ed Humanities and Fine Arts		3	
Wellness Gen Ed		2			
		19		18	

Total Credits: 74

Pharmacy

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-7456
- **Department Web Site:**
www.ndsu.edu/pharmacy/ (<http://www.ndsu.edu/pharmacy/>)
- **Credential Offered:**
B.S.; Pharm.D.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/pharmacy/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/pharmacy/>)

Major Requirements

Major: Pharmaceutical Sciences (Includes Pre-Pharmacy) Requirements

Degree Type: B.S.

Minimum Degree Credits to Graduate: 127-136

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	

COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Pre-Pharmacy Requirements

DEGREE NOTES:

- Student admitted to the Pharm.D. program will earn a Bachelor of Science Degree with a major in Pharmaceutical Sciences with successful completion of all courses through the second year of the professional Pharm.D. program as well as undergraduate graduation requirements including general education.
- Selected Core Courses - see information below for grading and GPA information.

Code	Title	Credits
BIOL 150 & 150L	General Biology I and General Biology I Laboratory *	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory *	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory (May satisfy general education category S)	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (May satisfy general education category S) *	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (May satisfy general education category S) *	4
CHP 190	Critical Thinking and Academic Success	2
COMM 110	Fundamentals of Public Speaking *	3
COMM 216	Intercultural Communication (May satisfy general education category B and D) *	3
ECON 201	Principles of Microeconomics (May satisfy general education category B and G) *	3
ENGL 120	College Composition II *	3
MATH 146	Applied Calculus I (May satisfy general education category R) *	4
MICR 460	Pathogenic Microbiology	3
PHYS 211	College Physics I	3
STAT 330	Introductory Statistics (May satisfy general education category R) *	3
Biochemistry - select from below: ¹		5 or 6
BIOC 460 & BIOC 461	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry and Molecular Biology II	
PSCI 301	Biochemistry and Molecular Biology for Pharmacists (Limited to Early Admission Pathway (EAP) students)	
Organic Chemistry - select from below: ¹		5 or 7

CHEM 341 & 341L & CHEM 342	Organic Chemistry I and Organic Chemistry I Laboratory and Organic Chemistry II *	
PSCI 300	Pharmaceutical Organic Chemistry (Limited to Early Admission Pathway (EAP) students)	
Microbiology - select from below: *		3 or 5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	
MICR 350 & 350L	General Microbiology and General Microbiology Lab *	
Upper Division Writing - select from below ¹		3
ENGL 324 or ENGL 325	Writing in the Sciences (May satisfy general education category C) Writing in the Health Professions	
PHRM 324	Writing and Professionalization in Pharmacy (Limited to Early Admission Pathway (EAP) students)	
Professional Pharmacy P1 & P2 Years		72-76

¹ Curricular plan based on traditional admissions path or early acceptance path. Consult adviser for additional information.

Selected Core Courses

Selected core courses will be used for selection criteria to determine GPA used in calculation for admission to the professional program. These courses must show evidence of letter grade, or other means of demonstrating acceptable competency (i.e. AP – CEEB) and MUST be completed by the end of fall semester prior to the admissions deadline to apply to the pharmacy program. Remaining courses, which are required and listed in the pre-pharmacy curriculum, MUST be completed by the end of spring term. The only exception to this is that up to six credits of electives may be completed during the summer term.

Pre-Professional Pharmacy Requirements and Notes

- All courses listed for pre-pharmacy must be complete in order to apply for the professional program in the last spring semester in which pre-requisite courses are taken.

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above.
- All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College of Health Professions.

Major Requirements

Major: Doctor of Pharmacy

Degree Type: Pharm.D.

Minimum Degree Credits to Graduate: 153

Professional Pharm.D. Requirements

The following professional Pharm.D. requirements that follow are subject to change per department. Students follow the curricula developed by the School of Pharmacy and any changes that occur while in the professional program will be communicated to the students by the School of Pharmacy.

In addition to curriculum listed below, 6 credits of Professional Elective MUST be completed PRIOR to P4 year. Other changes to curriculum will be conveyed to students as they are approved.

Code	Title	Credits
P1 First Year Professional		
MICR 470	Basic Immunology	3
PSCI 367	Pharmaceutical Calculations	1
PSCI 368	Pharmaceutics I	3
PSCI 369	Pharmaceutics II	2
PSCI 410	Pharmaceutical Biotechnology	2
PSCI 411	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 412	Chemotherapeutic/Infectious Disease Pharmacodynamics	3
PSCI 470	Pharmacokinetics	3
PHRM 301	Top Drugs I	1

PHRM 340	Patient Assessment and Pathophysiology I	4
PHRM 341	Pathophysiology II	3
PHRM 351L	Pharmacy Practice Laboratory I	2
PHRM 353	Introduction to Pharmacy and the Health Care System	3
PHRM 455	Community Introductory Pharmacy Practice Experience	4
PHRM 480	Drug Literature Evaluation	3
P2 Second Year Professional		
CHP 400	Interprofessional Health Care Practice	3
PSCI 413	Endocrine/Respiratory/GI Pharmacodynamics	3
PSCI 414	Cardiovascular Pharmacodynamics	3
PSCI 415	Neuropsychiatry Pharmacodynamics	3
PSCI 417	Pharmacogenomics	2
PHRM 355	Institutional Introductory Pharmacy Practice Experience	3
PHRM 400	Top Drugs II	1
PHRM 450	Self Care	3
PHRM 452L	Pharmacy Practice Laboratory II	2
PHRM 532	Infectious Disease	3
PHRM 534	Rheumatology/Endocrinology/Gastrointestinal	3
PHRM 535	Hematology and Oncology	3
PHRM 538	Cardiovascular and Pulmonary Diseases	4
PHRM 565	Pharmacy-Based Immunization Delivery	1
P3 Third Year Professional		
PHRM 500	Top Drugs III	1
PHRM 520	Special Populations	3
PHRM 536	Neurology & Psychiatry Pharmacotherapy	3
PHRM 537	Renal Disease/Fluid and Electrolytes	2
PHRM 540	Public Health for Pharmacists	3
PHRM 545L	Pharmacotherapy Laboratory	1
PHRM 551L	Pharmacy Practice Laboratory III	2
PHRM 552L	Pharmacy Practice Laboratory IV	2
PHRM 560	Specialty Care Topics	2
PHRM 570	Pharmacy Practice Improvement and Project Management	2
PHRM 572	Pharmacy Law and Ethics	3
PHRM 575	Pharmacy Management	3
PHRM 580	Pharmacotherapy Capstone	3
Professional Electives List of professional electives in handbook and in Blackboard PharmD Student Community.		6
P4 Fourth Year Professional		
Student will choose 8 out of 9 rotations for a total of 40 credits. Each rotation is 5 credits.		40
PHRM 581	Advanced Pharmacy Practice Experience - Rotation I	
PHRM 582	Advanced Pharmacy Practice Experience - Rotation II	
PHRM 583	Advanced Pharmacy Practice Experience - Rotation III	
PHRM 584	Advanced Pharmacy Practice Experience - Rotation 4	
PHRM 585	Advanced Pharmacy Practice Experience - Rotation 5	
PHRM 586	Advanced Pharmacy Practice Experience - Rotation 6	
PHRM 587	Advanced Pharmacy Practice Experience - Rotation 7	
PHRM 588	Advanced Pharmacy Practice Experience - Rotation 8	
PHRM 589	Advanced Pharmacy Practice Experience - Rotation 9	

Total Credits**153**

- All applicants to the NDSU Doctor of Pharmacy program must apply using the PharmCAS admissions website. It is imperative that the NDSU Pharmacy supplemental application be completed and submitted to the NDSU School of Pharmacy by all persons wishing to be considered for acceptance into NDSU's Entry-Level Pharm.D. Program.

- The application deadline can be found on the School of P (<https://www.ndsu.edu/pharmacy/>)harmacy website (<https://www.ndsu.edu/pharmacy/>).
- PCAT: We do require the PCAT (<http://www.pearsonassessments.com/haiweb/Cultures/en-US/site/Community/PostSecondary/Products/pcat/pcathome.htm>) (Pharmacy College Admission Test). The College requires that students take either the PCAT in July, September, October or November 2021 for students applying for 2022. We will accept PCAT scores from exams taken back three years (July 2018 to November 2021).
- Applicants who are NOT currently NDSU students must submit official transcripts of previous academic work to the University's Admissions Office and one set to the NDSU School of Pharmacy.
- Students not previously enrolled at NDSU must apply both to NDSU and to the School of Pharmacy within College of Health Professions. For an NDSU application (<https://www.ndsu.edu/apply/>), contact the Office of Admissions at 701-231-8643. For International students, contact the Office of International Programs at 701-231-7895.

Philosophy/Ethics

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
www.ndsu.edu/history/philosophy/ (<http://www.ndsu.edu/history/philosophy/>)
- **Credential Offered:**
B.S.; B.A.; Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/philosophy-ethics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/philosophy-ethics/>)

North Dakota State University offers students a philosophy curriculum that may be approached either as a philosophy-ethics major and a philosophy/humanities minor.

The Program

People have always had fundamental questions about the world in which they live. Among a wide variety of practical topics, they wondered about truth, knowledge, morality, goodness, or life's meaning. By means of dialogue, logic, and critical and creative thought, philosophers have trailblazed pathways to wisdom and an understanding of the human condition, which not only helps our students live more fulfilled lives but makes them more competitive in their careers.

The Faculty

- Dennis Cooley
- Anthony Flood
- John Helgeland (Emeritus)
- Bradley Morris
- Adam Taylor

The Philosophy-Ethics Major

The philosophy-humanities major consists of 32 semester credits. Of these, the 21 credits are required. 11 elective credits, which can be independent studies, complete the major.

The Philosophy-Humanities Minor

The philosophy-humanities minor consists of 21 semester credits: 15 required and 6 elective credits from the elective philosophy courses, including independent studies.

Independent Study

Independent study along the lines of Oxford tutorials may be pursued by students wanting to read on a special philosophical topic (e.g., aesthetics) or read the work of a particular philosopher. To initiate independent study, students must contact a philosophy faculty member.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
PHIL 101		3 PHIL 210 or 215	3
PHIL 257		3 GE Quantitative Reasoning	3
GE Science and Technology		3 GE Science and Technology	3
GE Social and Behavioral Science		3 GE Social and Behavioral Science	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
COMM 110		3 PHIL 323 or 324	3
PHIL 321 or 322		3 GE Wellness	2
GE Humanities Req.		3 AHSS Social and Behavioral Science	3
GE Science and Technology w/ Lab		4 GE Fine Arts Req.	3
Minor/Free Elective		3 Free Electives	6
		16	17
Third Year			
Fall	Credits	Spring	Credits
PHIL 450 or 486		3 PHIL 451	3
AHSS Humanities Req.		3 AHSS Fine Arts Req.	3
Minor or Foreign Language		3 Minor or Foreign Language	3
Minor or Free Electives		6 Minor or Free Electives	6
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
PHIL/HUM Electives		6 PHIL/HUM Electives	5
Minor or Foreign Language		3 Minor or Foreign Language	3
Minor or Free Electives		6 Minor or Free Electives	6
		15	14

Total Credits: 122

Philosophy

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
www.ndsu.edu/history/philosophy/ (<http://www.ndsu.edu/history/philosophy/>)
- **Credential Offered:**
B.S.; B.A.; Minor
- **Plan Of Study Sample:**

bulletin.ndsu.edu/undergraduate/programs-study/undergraduate/philosophy-ethics/ (<http://bulletin.ndsu.edu/undergraduate/programs-study/undergraduate/philosophy-ethics/>)

Major Requirements

Major: Philosophy/Ethics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Philosophy/Ethics Major Requirements		
PHIL 101	Introduction to Philosophy (May satisfy general education category A)	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic (May satisfy general education category R)	3
PHIL 321	Ancient Philosophy	3
or PHIL 322	Medieval Philosophy	
PHIL 323	Modern Philosophy	3
or PHIL 324	Contemporary Philosophy	
PHIL 451	Epistemology	3
Capstone Experience: Select one of the following:		3
PHIL 450	Metaphysics (May satisfy general education category C)	
PHIL 486	Philosophy & Literature	
PHIL 494	Individual Study	
Philosophy/Ethics Major Electives		11
Total Credits		32

Program Note: Waivers to any of the program requirements listed above is not possible. Students must complete a minimum of 32 credits for the Philosophy/Ethics major.

Minor Requirements

Minor: Philosophy-Humanities

Minor Requirements

Required Credits: 21

Code	Title	Credits
Required Minor Courses		
PHIL 101	Introduction to Philosophy	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic	3
PHIL 450	Metaphysics	3
or PHIL 451	Epistemology	
PHIL 486	Philosophy & Literature	3
or PHIL 494	Individual Study	
Philosophy Electives		6
Total Credits		21

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Physical Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**

B.S.; B.A.

• **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/physical-education/#planofstudypemajortext (<http://bulletin.ndsu.edu/programs-study/undergraduate/physical-education/#planofstudypemajortext>)

Major Requirements

Major: Physical Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Physical Education Core Requirements		
HNES 110	Introduction to Health and Physical Education ¹	3
HNES 211	Successful Coaching ¹	1
HNES 217	Personal and Community Health ¹	2-3
or HNES 100	Concepts of Fitness & Wellness	
or HNES 111	Wellness	

HNES 255	Professional Preparation in Middle School Physical Education ⁴	3
HNES 301	Motor Learning and Performance ³	3
HNES 336	Methods Of Coaching ³	3
HNES 367	Principles of Conditioning ³	3
PSYC 111	Introduction to Psychology (May satisfy general education category B)	3
Option: Select either the K-12 Teaching Licensure Option or the Coaching & Physical Activity Leadership Option		52 or 54
Total Credits		73-76

K-12 Teacher Licensure Option

Code	Title	Credits
HDFS 230 or PSYC 250	Life Span Development (May satisfy general education category B) ² Developmental Psychology	3
HNES 254	Curriculum, Standards and Assessment in Physical Education ¹	3
HNES 256	Professional Preparation in High School Physical Education ¹	3
HNES 257	Professional Preparation in Elementary School Activities ¹	3
HNES 350	Fitness Education Activities and Materials ¹	3
HNES 353	Adapted Physical Education ¹	3
HNES 461	Administrative and Social Aspects of Physical Education and Athletics ¹	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment ¹	3
EDUC 481	Classroom Practice Methods of Teaching I: (PE K-12 section) ²	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		52

Coaching and Physical Activity Leadership Option

Code	Title	Credits
HDFS 230	Life Span Development	3
HDFS 330	Child Development	3
HDFS 340	Adolescent Development	3
HNES 190	Introduction to Sport Management	3
HNES 226	Socio-Cultural Dimension in Sport	3
HNES 250	Nutrition Science	3
HNES 274	Introduction to Youth and Interscholastic Sport	3
HNES 324	Sport and Event Management	3
HNES 349	Advanced Coaching	3
HNES 431	Governance, Policy, Legal Liability and Ethics in Sport	3
HNES 485	Sport Management Internship	12
PSYC 340	Psychology in Sport	3
Electives:		9
COMM 114	Human Communication	
COMM 212	Interpersonal Communication	
EDUC 322	Educational Psychology	
EDUC 451	Instructional Planning, Methods and Assessment	
EDUC 489	Teaching Students of Diverse Backgrounds	
HDFS 341	Parent-Child Relations	

HNES 304	Sport Promotion and Public Relations
HNES 353	Adapted Physical Education
HNES 436	Managing Sport Facilities
HNES 473	Anaerobic Exercise Prescription and Advanced Resistance Training Techniques
SOC 214	Social Interaction
SOC 235	Cultural Diversity

Total Credits**54**

- 1 Students must earn a grade of "B" or better for the K-12 Teacher Licensure Option
- 2 Students must earn a "C" or better for the K-12 Teacher Licensure Option
- 3 Students may only earn one "C" among these three courses for the K-12 Teacher Licensure Option
- 4 Students must earn a "B" or better (Both Options)

Degree Requirements and Notes

- K-12 Teacher Licensure Option
 - A GPA of 2.75 or better is required for placement in student teaching and to exit from the program.
 - A GPA of 2.75 or better is required within the professional education requirements and students must take the Praxis II Subject Assessment and PLT to exit the program.
 - Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
 - See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Coaching and Physical Activity Leadership Option
 - A GPA of 2.75 or better is required to exit from the program.
 - Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Physical Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/physical-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/physical-education/>)

The physical education teacher education (PETE) program provides opportunities for students to become critical thinkers, creative planners and effective practitioners.

The Physical Education Program

To be successful in the field, a physical education teacher candidate must like to work with people, be adequately skilled in physical activities, have a commitment to wellness and be interested in the physical, biological and social sciences.

The PETE program emphasizes teaching and provides teacher candidates with skills and techniques necessary to begin a successful career in K-12 physical education. The courses are strategically structured to be sequential in nature. Teacher candidates develop their teaching skills and confidence through a variety of hands-on teaching experiences prior to student teaching. These experiences include our unique NDSU Let's Move in Homeschool physical education program held on campus each fall and spring as well as Adopt-a-School service learning program.

Teacher candidates majoring in physical education will study the art and science of human movement, including classes in elementary, middle and high school activities; motor learning, physiology and the psychology of human movement; the art of teaching and motivating students; and an appreciation of the individual differences of all people. These courses are taught by the Department of Health, Nutrition, and Exercise Sciences (HNES). Teacher candidates also complete professional education courses through the School of Education (SOE).

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the SOE. Prior to enrolling in the 400-level EDUC courses, teacher candidates must complete the application for admission to the SOE; earn required grades in all core physical education

courses (as specified in the handbook); maintain at least a 2.75 grade point average overall in their course work and education courses; and pass the Core Academic Skills for Educators test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

STUDENT TEACHING

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced physical education teachers in elementary, middle and high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Technology in Physical Education

Physical education majors at North Dakota State University are taught how to use and apply a variety of technologies and software to analyze physical activity skills and strategies, assess K-12 student progress towards meeting standards and outcomes, and reflect on their teaching effectiveness, K-12 student accountability, and personal reflection.

Double Major

It is recommended that physical education majors obtain a degree enhancement through a double major. The physical education curriculum has been structured to allow PETE students to obtain a health education major during the same four-year time frame. The acquisition of additional credentials helps to prepare future professionals, giving them a broader area of expertise and making them more marketable. For further information about the health education major, please refer to the Health Education Fact Sheet.

CERTIFICATION

Upon completing this program, teacher candidates are eligible for teacher licensure in physical education in most states. Our PETE program is aligned with the National Standards Guidelines for Physical Education Teacher Education and is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Teacher candidates leave prepared to teach in a professional manner, while demonstrating exemplary ethical behavior and displaying current best practices. Graduates are expected to be positive role models for K-12 students in the area of physical education, physical activity and sports.

Career Opportunities

Graduates in physical education find career opportunities teaching in both public and private educational settings, coaching within the community, athletic programs including college athletics, community sports positions with parks and recreation facilities, and/or local recreation organizations such as the YMCA. If interested in coaching at higher education institutions, students are encouraged to maintain a 3.0 GPA to increase their likelihood of acceptance into graduate school to pursue the necessary master's degree required to coach at this level.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

PHYSICAL EDUCATION TEACHING MAJOR

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
HNES 110*		3 COMM 110	3
PSYC 111		3 Science/Technology w/ Lab	4
HNES 255*		3 Elective	3
Quantitative Reasoning		3 Humanities/Fine Art	3
		15	16
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 EDUC 322	3
HNES 100, 111, or 217*		2-3 HNES 257*	3
HNES 211		1 PSYC 250 or HDFS 230	3
HNES 254*		3 Science/Technology	3

HNES 256*	3	Elective	3
Science/Technology	3	Apply to the School of Education	
Complete Core Academic Skills Exam or access your ACT+ scores			
15-16			15
Third Year			
Fall	Credits	Spring	Credits
HNES 301**		3 EDUC 489	3
HNES 336**		3 HNES 350*	3
HNES 367**		3 HNES 353*	3
Elective		3 Humanities/Fine Arts	3
EDUC 451 (PE Section)*		3 Upper Division Writing	3
15			15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (PE Section)***		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
HNES 461*		3 EDUC 488	3
Electives		7	
Apply for Student Teaching			
Complete PLT (grades K-12) exam			
Complete Subject Area Assessment Exam			
16			13
Total Credits: 120-121			

- * Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).
- Global Perspectives and Diversity requirements can be obtained through careful selection of electives, Humanities/Fine Arts, and/or Science/Technology categories
- *** Students are required to earn a grade of C or better in course marked with three asterisks (***).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Physical Education/Health Education Double Major

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
HNES 110*		3 ENGL 120	3
PSYC 111		3 Quantitative Reasoning	3
Science/Tech		3 Humanities/Fine Arts	3
HNES 255*		3 Science/Technology w/ Lab	4
15			16
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 HNES 250 ^{Requires a grade of C}	3

EDUC 322	3	HNES 217 [*]	3
HNES 211	1	HNES 341 [*]	3
HNES 254 [*]	3	HNES 257 [*]	3
HNES 256 [*]	3	PSYC 210 ^{***}	3
Humanities/Fine Arts	3	Science/Technology	3
Complete Core Academic Skills Exam or access your ACT+ scores	Apply to the School of Education		
		16	18
Third Year			
Fall	Credits	Spring	Credits
HNES 301 ^{**}	3	EDUC 489	3
HNES 336 ^{**}	3	HNES 345 [*]	3
HNES 367 ^{**}	3	HNES 350 [*]	3
PSYC 212 ^{***}	3	HNES 353 [*]	3
EDUC 451 (PE Section) [*]	3	Upper Division Writing	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (Health Section) ^{***}	3	EDUC 485	1
EDUC 481 (PE Section) ^{***}	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
PSYC 250 or HDFS 230	3		
HNES 461 [*]	3		
Apply for Student Teaching			
Complete PLT (grades K-12) Exam			
Complete Subject Area Assessment Exam			
		15	13
Total Credits: 123			

* Students are required to earn a "B" or better in these courses, but may earn one "C" among the three courses marked with two asterisks (**).

- Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts, and/or Science/Technology categories.

*** Students are required to earn a "C" or better in courses marked with three asterisks (***).

Physics

Department Information

- **Department Location:**
South Engineering
- **Department Phone:**
701-231-8974
- **Department Web Site:**
www.ndsu.edu/physics/ (<http://www.ndsu.edu/physics/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/physics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/physics/>)

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Physicists often end up in a wide range of leadership positions. Notable examples include Jimmy Carter, Elon Musk, Steven Wolfram, Douglas Hofstadter, and Angela Merkel.

Background Information

The Department of Physics has growing undergraduate and graduate programs. Yet, its size remains comparatively small, allowing personalized interactions between students with all of its 11 faculty members. Not only do students participate in research projects early on, they often become authors in peer-reviewed publications and present their results in the regional and national conferences and workshops. In addition, our students are highly engaged; they regularly participate successfully in the University Physics Competition and contribute actively to various outreach activities.

The Department of Physics has a strong research focus on three fields: materials (especially soft materials), computational physics, and physics education research. While this represents only a small subset of all existing physics fields, our focus makes us competitive and successful on the national level and beyond. Students can choose among a number of curricular options that prepare them for industrial, governmental, and academic careers. The Fargo/Moorhead urban area contains three colleges with a physics program. Courses can be taken in each college through the Tri-College University. This increases the number of available courses to a level typical for large universities only.

High School Preparation

A prospective physics major is generally expected to have taken physics, chemistry, and mathematics courses. Computer courses can also be useful. Incoming students should normally be ready to start learning calculus. Some of our incoming students have already taken AP courses in physics or mathematics. Note, however, that deficiencies in any of these subjects may be remedied in the freshman or later years at the University.

Curriculum Options

The most popular curricular option in the Department of Physics is the standard physics major. Also popular are our two double major programs in Physics and Mathematics as well as in Physics and Computer Science. Also, we offer new double majors in Electrical and Computer Engineering and Physics, and in Mechanical Engineering and Physics. All these programs allow well-prepared students to complete the requirements for both majors in four years by taking advantage of the close connections between physics, mathematics, computer science, and engineering. In addition, we offer a physics major with a focus on optical science and engineering. The optical science and engineering option, which is the only regional program of this type, includes an interdisciplinary optics/photonics sequence of courses taught by the Department of Physics and the Department of Electrical and Computer Engineering using a state-of-the-art optics teaching laboratory. Finally, highly qualified students can earn both a Bachelor's and Master's degree in physics by enrolling into the Accelerated Masters program in their junior year.

All of our physics majors (including the double majors and physics majors with the optical science and engineering option) take introductory courses in classical mechanics, computational physics, electricity and magnetism, optics, thermodynamics, quantum mechanics, and modern physics, as well as selected specialized courses such as photonics, lasers, or condensed matter physics. In addition, all physics majors get involved in research projects with faculty, typically in fields like materials (including bio- and polymer physics), computational physics, and physics education research. Two dedicated courses allow students to receive credit for their research efforts. Any of our curriculum options prepares students for graduate work in physics or related fields and subsequent employment in industry, government, or academia. Physics graduates have excellent job perspectives because they are widely valued as creative and persistent problem solvers who are often able to step into leadership positions.

Career Opportunities

A great variety of employment opportunities exist for physics majors who wish to pursue careers after obtaining a bachelor's degree. Some find positions in industry or government. Many technical industries seek physics graduates for work in software development, engineering, science and lab technician positions, management and sales. According to the results of the National Association of Colleges and Employers Winter 2020 Salary Survey, physics majors were expected to receive an average starting salary of \$72,086.

As technology continues to develop, there will be a need for skilled people to make new discoveries in the basic sciences. Because of this, talented physics majors are encouraged to pursue the doctoral degree. Outstanding doctoral graduates in physics find research and teaching positions in universities or employment in government laboratories and research-oriented industries.

An education in physics is so fundamental that it provides an excellent preparation for graduate education in nearly every technical field, including engineering. Additionally, North Dakota State University graduates in physics have entered medical schools and have studied law. One past graduate received a doctorate in biophysics and now works at the University of Minnesota Medical School; another is at the Mayo Clinic in Rochester, Minn. Some of our recent graduates worked on advanced degrees in biomedical engineering, chemical physics, electrical engineering, solid-state physics, meteorology and radiological science. A number of recent graduates have pursued graduate studies at schools such as Cornell University, Michigan State University, the University of Minnesota, Carnegie Mellon University, Ohio State University, University of Illinois at Chicago, State University of New York Stony Brook, Rutgers University and Northwestern University.

Financial Aid

Financial aid at NDSU is available in the form of loans, grants, scholarships, and work-study. Students who qualify for federal college work-study may be paid for work on department research projects. Highly qualified students may be hired through the Department of Physics or the College of Science and Mathematics as undergraduate Research Assistants (RA) or Learning Assistants (LA).

Internships

The Cooperative Education Program provides students the opportunity to earn money and gain valuable experience by spending one or more semesters working in industrial or government laboratories. Internship opportunities include Sanford Medical Center in Fargo and NASA. Students may also apply to participate in research projects through the Department of Physics or Research Experience for Undergraduates program at NDSU or other institutions.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
PHYS 171		1 PHYS 251 & 251L	5
MATH 165		4 PHYS 251R	1
CHEM 150 & CHEM 160		4 MATH 129 or 329	3
ENGL 110 or 120 (based on placement)		3 MATH 166	4
Wellness Gen Ed		2 CHEM 151 & CHEM 161	4
		14	17
Sophomore			
Fall	Credits	Spring	Credits
PHYS 252 & 252L		5 CSCI 161	4
PHYS 252R		1 PHYS 350	3
MATH 265		4 MATH 266	3
CSCI 160		4 COMM 110	3
		Humanities/Fine Arts & Global Perspectives Gen Ed	3
		14	16
Junior			
Fall	Credits	Spring	Credits
PHYS 355		3 PHYS 370	3
PHYS 360		3 ENGL 324	3
MATH 4XX Math Elective		3 PHYS 361	3
Free elective		4 MATH 4XX Math Elective	3
Free Elective		3 Humanities/Fine Arts Gen Ed	3
		16	15
Senior			
Fall	Credits	Spring	Credits
PHYS 462		3 PHYS 489	2
PHYS 485		3 PHYS 481	3

PHYS 411 & 411L	4 PHYS 486	3
PHYS 488	1 Physics Elective	3
Social and Behavioral Science Gen Ed	3 Social and Behavioral Science & Cultural Diversity Gen Ed	3
14		14

Total Credits: 120

Physics

Department Information

- **Department Location:**
South Engineering
- **Department Phone:**
701-231-8974
- **Department Web Site:**
www.ndsu.edu/physics/ (<http://www.ndsu.edu/physics/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/physics/#planofstudytext>)

Major Requirements

Major: Physics - Standard

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2

Cultural Diversity (D) ^{†}****Global Perspectives (G) ^{**†}**

Total Credits	39
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* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. [*]		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences [*]		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements - Standard

A grade of 'C' or better is required for all PHYS and AST prefix courses.

Code	Title	Credits
Physics Major Requirements (Standard)		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
Physics Electives: Select two from the following:		6
PHYS 215	Research For Undergraduates	
PHYS 413	Lasers for Scientists and Engineers	
PHYS 415	Elements of Photonics	
PHYS 463	Statistical Mechanics	
PHYS 481	Condensed Matter Physics	
MSUM AST	Astronomy courses (300/400 level) with departmental approval	
Related Required Courses		
CSCI 160 or ECE 173	Computer Science I Introduction to Computing	4

CSCI 161	Computer Science II	4
MATH 129	Basic Linear Algebra	3
or MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives - Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level (MATH 488 & MATH 489 are recommended)		
Select one of the following chemistry sequences (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following chemistry sequences (151/161 recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		90

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Major Requirements

Major: Physics with Optical Science and Engineering Option

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6

Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

MAJOR REQUIREMENTS - Optical Science and Engineering OPTION

A grade of 'C' or better is required for all PHYS prefix courses.

Code	Title	Credits
Physics Major Requirements (Optical Science & Engineering Option)		
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory (May satisfy general education category S)	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory (May satisfy general education category S)	5
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics (or PHY 330: Intermediate Mechanics from MSUM)	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHY 370: Electromagnetic Theory from MSUM)	3
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 413	Lasers for Scientists and Engineers	3
PHYS 415	Elements of Photonics	3
PHYS 462	Thermal and Statistical Physics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 488	Senior Project I	1
PHYS 489	Senior Project II	2
CSCI 160 or ECE 173	Computer Science I Introduction to Computing	4
EE 206	Circuit Analysis I	4
Related Required Courses		
MATH 129 or MATH 329	Basic Linear Algebra Intermediate Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4

MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives: Select 6 credits from the following:		6
MATH 270	Introduction to Abstract Mathematics	
MATH 400 Level (MATH 452, MATH 481, and/or MATH 488 are recommended)		
Select one of the following (150/160 is recommended):		4
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 is recommended):		4
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Total Credits		90

PROGRAM NOTES

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Recommended Electives for the Optical and Engineering Option

Code	Title	Credits
ECE 311	Circuit Analysis II	4
ECE 321	Electronics II	2
ECE 417	Optical Signal Transmission	3
ECE 483	Instrumentation for Engineers	3

Minor Requirements

Minor: Physics

Required Credits: 19

Code	Title	Credits
Required Courses		
PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1
PHYS 350	Modern Physics	3
Electives: Select 7 credits from the following:		7
PHYS 171	Introductory Projects in Physics	
PHYS 251L	University Physics I Laboratory	
PHYS 251R	University Physics I Recitation	
PHYS 252R	University Physics II Recitation	
PHYS 215	Research For Undergraduates	
Any 300-400 level Physics course		
ME 221 and ME 222 may be substituted for PHYS 251 and PHYS 251L		
Total Credits		19

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Physics Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/physics-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/physics-education/>)

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, engineering, materials science, photonics, biology, medicine, geology, and environmental science. Teaching physics in secondary schools requires deep knowledge of (a) science content, (b) current theories of adolescent development, and (c) current best practices in instruction. Accordingly, the physics education major combines coursework in physics and related sciences with professional education courses on teaching and learning.

The Program

Candidates in physics education are prepared to teach students in grades 5-12 with skill and confidence. The program is designed to develop science content knowledge as well as proficiency in a range of science-related skills and laboratory practices. Our professional education courses prepare teacher candidates to incorporate active learning strategies, create effective methods for assessment, and adjust instruction to accommodate diverse learners. Teacher candidates also apply their knowledge and build their teaching skills during multiple clinical experiences in local schools.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills test or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teacher preparation program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced science teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate student teachers so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Physics education teacher candidates are assigned to academic advisors who work closely with them to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to meet with their advisor at least once every semester, as well as whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for teacher licensure in physics in most states. Teacher candidates who take the Praxis Subject Assessment exam for Physics will be licensed to teach Physics and related courses, as well as middle school sciences. Teacher candidates who choose to take the Praxis Subject Assessment exam for General Science will be licensed to teach all areas of middle school and high school science. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

Science teachers are in high demand across the country, so our graduates usually obtain full-time employment in school districts shortly after graduation. Notably, by completing 6 additional credit hours, physics education majors can become licensed to teach mathematics as well. See your academic advisor for specific course requirements.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110 or 120 (or College Composition II based on placement)**		3 CHEM 122 & 122L	4
CHEM 121 & 121L		4 MATH 129 or 329	3
COMM 110		3 MATH 166	4
MATH 165		4 PHYS 251 & 251L	5
PHYS 171		1 PHYS 251R	1
		15	17
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 EDUC 322	3
GEOL 105 & 105L (Meets Global Perspectives Gen Ed requirement)		4 MATH 266	3
MATH 265		4 PHYS 110	3
PHYS 252 & 252L		5 PHYS 350	3
PHYS 252R		1 Social & Behavioral Science Gen Ed*	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
		17	15
Third Year			
Fall	Credits	Spring	Credits
BIOL 124 & BIOL 100L		4 BIOL 150 & 150L	4
EDUC 451		3 EDUC 481	3
ENGL 324		3 EDUC 486	3
PHYS 355		3 PHYS 361	3
Humanities & Fine Arts Gen Ed*		3 Social & Behavioral Science Gen Ed*	3
		Wellness Gen Ed	2
		16	18
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 482		3 EDUC 485	1
EDUC 489		3 EDUC 487	9
PHYS 411 & 411L		4 EDUC 488	3
PHYS 462		3	
Humanities & Fine Arts Gen Ed*		3	
Apply for Student Teaching			

Complete PLT (grades 7-12) Exam

Complete Subject Area Assessment
Exam

16

13

Total Credits: 127

* One of these General Education courses needs to be selected from Category D - Cultural Diversity.

** If placed into ENGL 110 in Fall of Freshman year, then ENGL 120 (3 credits) needs to be added to the plan in a different semester.

Physics Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/physics-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/physics-education/#planofstudytext>)

Major Requirements

Major: Physics Education

Degree Type: B.A. or B.S.

Required Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		

Global Perspectives (G) ^{†}****Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Pick an introductory chemistry sequence (A or B):		8
Sequence A:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
Sequence B:		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	
ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
Pick one of the following:		4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab (May satisfy general education category G)	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab (May satisfy general education category G)	
Select one of the following two Algebra Courses:		3
MATH 129	Basic Linear Algebra	
MATH 329	Intermediate Linear Algebra	
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
PHYS 110	Introductory Astronomy	3
PHYS 171	Introductory Projects in Physics	1
PHYS 251 & 251L & 251R	University Physics I and University Physics I Laboratory and University Physics I Recitation	6
PHYS 252 & 252L & 252R	University Physics II and University Physics II Laboratory and University Physics II Recitation	6
PHYS 350	Modern Physics	3
PHYS 355	Classical Mechanics (or PHYS 330: Intermediate Mechanics (MSUM))	3
PHYS 361	Electromagnetic Theory (or PHYS370: Electromagnetic Theory (MSUM))	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 462	Thermal and Statistical Physics	3
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3

EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
EDUC 482	Classroom Practice/Methods of Teaching II: (Science)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		103

Degree Requirements and Notes

- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.
- Courses taken P/F may not be used to satisfy any requirements.
- A grade of 'C' or better is required in all professional education courses.
- To be placed in student teaching, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required.
- To exit the program, a 2.75 cumulative GPA and a 2.75 GPA in professional education coursework is required as well as completing the Praxis Subject test and the Principles of Learning and Teaching test.
- Adding Mathematics as an additional teacher licensure area can be accomplished with 6 additional credit hours. See your academic advisor for details.

Political Science

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/political-science/#planofstudystandardtext (<http://bulletin.ndsu.edu/programs-study/undergraduate/political-science/#planofstudystandardtext>)

Major Requirements

Major: Political Science - Standard

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110	Introduction to Political Science (May satisfy general education category B)	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	

POLS 240	Political Ideologies	3
POLS 325	Applied Research Methods	3
or CJ 325	Applied Research Methods	
STAT 330	Introductory Statistics	3
Select a minimum of five courses from at least three of the four areas listed below (Area 1-4):		15
Area 1:		
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 423	Public Policy Analysis	
Area 2:		
POLS 430	Constitutional Law-Civil Liberties	
POLS 431	Constitutional Law-Criminal Justice	
Area 3:		
POLS 442	Global Policy Issues	
POLS 444	International Law	
POLS 445	Ethnic Conflicts	
POLS 453	Environmental Policy and Politics	
POLS 446	International Criminal Law	
Area 4:		
POLS 442	Global Policy Issues	
POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
POLS 453	Environmental Policy and Politics	
Political Science Electives		9
Courses which are eligible to fulfill this requirement may come from the following list of courses, or from Special Topic classes offered by the Political Science department (requires a substitution form to be submitted to the Office of Registration and Records signed by dept. chairperson), or from classes not selected to meet area 1-4 requirements.		
POLS 120	Terrorism	
POLS 210	Current Politics	
POLS 215	Problems and Policies In American Government	
POLS 216	Campaigns and Elections	
POLS 230	Judicial Process	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
POLS 360	Principles of Public Administration	

Total Credits**39**

Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Major Requirements

Major: Political Science - Pre-Law Option

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110 or POLS 115	Introduction to Political Science (May satisfy general education category B) American Government	3
POLS 220 or POLS 225	International Politics Comparative Politics	3
POLS 240	Political Ideologies	3
POLS 325 or CJ 325	Applied Research Methods Applied Research Methods	4
POLS 489	Senior Seminar	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Pre-Law Emphasis Requirements:		
A single International Law course satisfies either a core requirement or an Area 2 requirement, but not both.		
POLS	100 or 200 level	3
POLS 230	Judicial Process	3
POLS 430	Constitutional Law-Civil Liberties	3
POLS 431	Constitutional Law-Criminal Justice	3
POLS 444 or POLS 446	International Law International Criminal Law	3
Additional Program Requirements: Complete requirements as indicated from each of the three professional areas listed below for the Pre-Law Option (I, II, & III)		
Professional Area I: One course from each of the following three areas.		9
Area One:		
POLS 420	Political Behavior-Executive-Legislative Process	
POLS 421	Political Behavior-Political Parties	
POLS 422	State and Local Politics	
POLS 423	Public Policy Analysis	
Area Two:		
POLS 442	Global Policy Issues	
POLS 445	Ethnic Conflicts	
POLS 453	Environmental Policy and Politics	
POLS 444 or POLS 446	International Law International Criminal Law	
Area Three:		
POLS 442	Global Policy Issues	
POLS 450	Politics of the Developing Countries	
POLS 451	Politics of the Industrialized Countries	
POLS 452	Comparative Political Economy	
POLS 453	Environmental Policy and Politics	
Professional Area II: Communication Component - Select 2 courses from the following:		6
COMM 214 or COMM 308	Persuasive Speaking Business and Professional Speaking	
COMM 216	Intercultural Communication	
COMM 318 or COMM 383	Argumentation and Advocacy Organizational Communication I	
ENGL 358	Writing in the Humanities and Social Sciences	
Professional Area III: Law Related Courses - Select 2 courses from the following:		5-6
ACCT 410	Fraud Examination	
BUSN 430	Legal and Social Environment of Business	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	

CJ 201	Introduction to Criminal Justice
CJ 230	Criminology
CJ 330	Criminal Law and Procedure
COMM 433	Legal Communication
COMM 434	Communication Law

Total Credits	54-55
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Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Major Requirements

Major: Political Science - Public Service Option

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Core Requirements		
POLS 110 or POLS 115	Introduction to Political Science (May satisfy general education category B) American Government	3
POLS 220 or POLS 225	International Politics Comparative Politics	3
POLS 240	Political Ideologies	3
POLS Elective	100 or 200 level	3
STAT 330	Introductory Statistics (May satisfy general education category R)	3
Political Science - Public Service Emphasis:		
POLS 215	Problems and Policies In American Government	3
POLS 325 or CJ 325	Applied Research Methods Applied Research Methods	3
POLS 420	Political Behavior-Executive-Legislative Process	3
POLS 422	State and Local Politics	3
POLS 423	Public Policy Analysis	3
POLS 430 or POLS 431	Constitutional Law-Civil Liberties Constitutional Law-Criminal Justice	3
POLS 442 or POLS 444 or POLS 446	Global Policy Issues International Law International Criminal Law	3
POLS 450 or POLS 451 or POLS 452	Politics of the Developing Countries Politics of the Industrialized Countries Comparative Political Economy	3
POLS 489	Senior Seminar	3
POLS 496	Field Experience	9
Supplemental Requirements: Pre-requisites apply to all courses. Select 5 courses from the following:		15
ACCT 200	Elements of Accounting I	
ACCT 201	Elements of Accounting II	
MGMT 320	Foundations of Management	
COMM 383	Organizational Communication I	
ECON 202	Principles of Macroeconomics	

EMGT 101	Emergencies, Disasters, and Catastrophes	
ENGL 320	Business and Professional Writing	
SOC 115	Social Problems	
HDFS 353	Children, Families and Public Policy	
Total Credits		66

Degree Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Minor Requirements

Minor: Political Science

Required Credits: 21

Code	Title	Credits
Required Courses		
POLS 110	Introduction to Political Science	3
or POLS 115	American Government	
POLS 220	International Politics	3
or POLS 225	Comparative Politics	
POLS 240	Political Ideologies	3
Electives: Areas of law, behavior, international relations or comparative politics (at 400 level)		6
Additional Electives: Selected in consultation with adviser		6
Total Credits		21

Minor Requirements and Notes

- Minimum cumulative GPA of 3.00 required in courses with the POLS prefix.

Political Science

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/political-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/political-science/>)

Political science is the study of politics, public policy, government and related topics. This includes the investigation of political behavior, international relations, law, and political values. The coursework in political science provides students with knowledge and understanding of how government and politics affect their everyday lives and ultimately prepares students for careers in a variety of politics- or government-related professions.

The Program

The political science program at North Dakota State University offers a number of avenues for the study of government. The curriculum in political science ensures that students graduate with a solid knowledge of key political science subfields, including American government and institutions, the legal system and Constitutional law, international relations, and comparative politics. In addition to the many course offerings available at NDSU, students can draw upon many additional courses through Tri-College University (a consortium of NDSU, North Dakota State College of Science, Minnesota State Community and Technical College, Minnesota State University Moorhead and Concordia College). The urban center of Fargo-Moorhead enables students to observe and participate in metropolitan judicial and governmental affairs.

Internship/Field Experience

The Department of Political Science & Public Policy has been very successful in helping students secure internships in local, state, and federal agencies where they can experience first-hand the functioning of government. NDSU students also regularly serve as interns for elected officials from North Dakota and Minnesota.

Career Opportunities

One out of five persons in the United States today is employed by some level of government. The expansion of the public sector has created a vital need for thoughtful and active people who are professionally trained in government and in political science. The type of jobs available to NDSU political science graduates include policy analyst, budget analyst, lobbyist, legislative aide, state or federal program administration, city/county administration, positions in non-profit organizations, diplomatic service, and other careers.

Political science students also regularly go on to attend law school and then pursue a legal profession. NDSU political science students have attended law schools such as the University of North Dakota, the University of Minnesota, the University of Michigan, the University of Washington, Northwestern University, Duke, and George Washington University. Still other NDSU political science students may elect to go on for graduate study in political science, public policy, or public administration and pursue advanced careers in public administration, regional planning, as researchers at think tanks, or as academicians.

Extra-Curricular Activities

The Department of Political Science & Public Policy works closely with the Pre-Law Club, which is designed to provide students with information about law schools, entrance examinations and career opportunities in the field of law.

The Faculty

Thomas Ambrosio, Professor, Ph.D., 2000, University of Virginia

Nicholas Bauroth, Professor, Ph.D., 2003, Loyola University

Ethan Boldt, Assistant Professor, Ph.D. 2019, University of Georgia

Sarah Boonstoppel, Assistant Professor, Ph.D., 2014, University of Maryland

Steven Briggs, Associate Professor, Ph.D., 2007, University of Nebraska – Omaha

Kjersten Nelson, Associate Professor, Ph.D., 2009, University of Minnesota

Daniel Pemstein, Associate Professor, Ph.D., 2010, University of Illinois at Urbana-Champaign

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
POLS 110 or 115		3 POLS 220 or 225	3
MATH 104 or 103		3 HUM/Fine Arts and Cult Div Gen Ed	3
ENGL 110		3 ENGL 120	3
HUM/Fine Arts and Glob Persp Gen Ed		3 Science/Tech Gen Ed	3
COMM 110		3 Minor	3
		15	15
Second Year			
Fall	Credits	Spring	Credits
POLS 240		3 POLS 325 or CJ 325	3
POLS 200-300 level elective		3 AHSS Requirement	3
STAT 330		3 Wellness Gen Ed	3
Science w/ Lab Gen Ed		4 Minor	3

Minor		3 General Elective		3
		16		15
Third Year				
Fall	Credits	Spring	Credits	
POLS Area 1		3 POLS Area 2		3
POLS Area 3		3 POLS Area 4		3
ENGL 320 or 358		3 Science/Tech Gen Ed		3
Minor		3 AHSS Requirement		3
AHSS Requirement		3 Minor		3
		15		15
Fourth Year				
Fall	Credits	Spring	Credits	
POLS elective		3 POLS 489		3
POLS elective		3 Elective		4
Minor		3 Elective		3
300-400 level general elective		4 300-400 level general elective		3
300-400 level general elective		3		
		16		13

Total Credits: 120

Pre-Law Minor

Department Information

- **Department Location:**
104A Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/pre-law/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/pre-law/>)

Pre-law can be a vital building block for students who pursue a career in law. Getting into law school is certainly an achievement, but it is just a start in the process of becoming a lawyer. Many students are unprepared for the sort of intensified reading, writing, and in-class argumentation necessary to succeed in law school. Indeed, depending on the institution, anywhere from ten to thirty percent of all new law students drop out of school by the end of their first year. A rigorous pre-law minor with a focus on abstract thoughts and methods would facilitate NDSU students' success in law school and beyond.

A law career itself lends itself to a generation of students who will change careers several times in their lives. Within the law itself, there are several different career paths available to students, including a private practice lawyer, corporate attorney, legal aid attorney, and in-house attorney for non-profit groups. Law is a stable and well-paying career option in the Upper Midwest. The profession of attorney is projected to grow by 3.0 percent by 2024 (as compared to 2014 numbers).

NDSU graduates who pursue a law education typically attend law school through the University of North Dakota, the University of Minnesota, or Hamline University. However, NDSU graduates have also been admitted to such prominent institutions as the University of Michigan Law School, the University of Notre Dame Law School, and DePaul University College of Law.

If you have any questions, please contact the NDSU Department of Political Science & Public Policy at ndsu.poli.sci@ndsu.edu.

Pre-Law

Department Information

- **Department Location:**
104A Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/pre-law/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/pre-law/>)

Minor Requirements

Minor: Pre-Law

Required Credits: 21

NOTE: A student completing this minor may not take any of the pre-law minor classes in the political science major/minor or toward other degree requirements (i.e. general education, college, or other major related requirements).

Code	Title	Credits
Core Courses		
POLS 230	Judicial Process	3
POLS 430 or POLS 431	Constitutional Law-Civil Liberties ¹ Constitutional Law-Criminal Justice	3
POLS 444 or POLS 446	International Law ¹ International Criminal Law	3
Communication Requirement		
COMM 214 or COMM 216	Persuasive Speaking Intercultural Communication	3
ENGL 320 or ENGL 358	Business and Professional Writing Writing in the Humanities and Social Sciences	3
Additional Law-Related Courses - Select two courses from the following:		6
CJ 201	Introduction to Criminal Justice	
CJ 230	Criminology	
CJ 330	Criminal Law and Procedure	
CJ 460	Criminal Court System	
COMM 431	Communication Ethics and Law	
HIST 434	Environmental History	
PHIL 257	Traditional Logic	
PHIL 370	Social and Political Philosophy	
POLS 430	Constitutional Law-Civil Liberties (if not used in the core) ¹	
POLS 431	Constitutional Law-Criminal Justice (if not used in the core) ¹	
POLS 444	International Law (if not used in the core) ¹	
POLS 446	International Criminal Law (if not used in the core) ¹	
PSYC 370	Forensic Psychology	
Total Credits		21

¹ One class of the pair must be used in the core and the other class may be used toward the six credits of the additional law-related courses.

Program Notes:

- All course pre-requisites apply.

Precision Agriculture

Department Information

- **Department Location:**
Agricultural and Biosystems Engineering
- **Department Phone:**
701-231-7261
- **Department Email:**
ndsu.aben@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/precision-agriculture/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/precision-agriculture/>)

A focused in-depth education in sciences, technologies and practices, including unmanned aerial systems (drones), remote sensing, acritical intelligence, machine learning, sensors, robotic applications, cloud computing, big data management, and site-specific resources management, awaits students in the precision agriculture (PAG) field. We prepare our graduates to apply their knowledge and skills to address profitability, production efficiency, and environmental stewardship related to modern high-tech agricultural production systems.

The Program

The PAG major in the College of Agriculture, Food Systems, and Natural Resources is administered by the Department of Agricultural and Biosystems Engineering. The PAG program leads to a Bachelor of Science degree and includes core requirements in mathematics, communications, sciences, humanities and social sciences. In the major, students will complete technical courses in machine principles, data mapping, electrical systems and electronics, crop production principles, computer applications for precision agriculture, remote sensing, data management, site-specific agriculture, and information/decision support technology. The curriculum balances instruction in agricultural sciences principles with hands-on training and application of technology. A degree is awarded after completion of a minimum of 120 credits.

The PAG major curriculum provides opportunities for individuals from both rural and urban backgrounds to choose courses to meet personal career objectives. Minors may be developed in related fields of production agriculture, agribusiness or in fields that add curriculum diversity, e.g., international studies, communication, natural resources management, business administration, accounting, or industrial management.

internships

The curriculum requires at least one internship, but students are highly encouraged to take advantage of as many internship opportunities as they wish, especially co-operative education experiences (paid internships). These are great opportunities for students to gain hands-on experience working with precision agriculture technologies. In addition, internship experiences allow students to make more informed decisions regarding their major, to make better selection of elective courses, and open doors for employment upon graduation.

Career opportunities

Opportunities for PAG graduates are many and diverse. Graduates may, for example, be employed by companies providing equipment and technical services related to precision agriculture, such as Titan Machinery, RDO Equipment, FarmersEdge, IntelligentAg,, John Deere. The adoption of aerial remote sensing and artificial intelligence is on the rise in both private and public sectors, which creates new employment opportunities for PAG graduates. In addition, one always can start his/her own business as a private consultant on precision agriculture.

Scholarships

Several scholarships are available through the department. These scholarships range from \$300 to \$4,000. Students also may be eligible for scholarships from the College of Agriculture, Food Systems, and Natural Resources.

Extra-Curricular Activities

The Precision Ag Club offers students opportunities to participate in professional and social activities with other students at the local and regional levels. Being an active participant in student organizations helps students develop leadership, teamwork, organization and communication skills.

A well equipped teaching facility

The PAG degree program is housed in the Agricultural and Biosystems Engineering building which includes offices, classrooms, and laboratories. Laboratories are equipped with state-of-the-art equipment typically used in industry and research, such as personal computers with software used to manipulate and to write prescriptions to field equipment, several models of unmanned aerial systems (drones), a variety of sensors (RGB,

multispectral, and hyperspectral) mounted to drones and to benches in the lab, tractors, engines, surveying equipment, etc. Faculty expertise varies across a wide and diverse range of specialties related to agricultural and biological systems.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman					
Fall	Credits	Spring	Credits		
PAG 115		2 PAG 215	3		
PAG 115L		1 CSCI 114 or TL 116	3		
ENGL 110		3 ENGL 120	3		
COMM 110		3 MATH 105	3		
MATH 103		3 PLSC 110 or ANSC 114	3		
Gen Ed Hum/Fine Arts		3			
		15	15		
Sophomore					
Fall	Credits	Spring	Credits	Summer	Credits
ASM 225		3 PLSC 225 or ANSC 220		3 PAG 496:: Field Exp./ Internship	1
AGEC 242		3 CHEM 121	3		
GEOG 455		4 CHEM 121L	1		
PPTH 324 or ANSC 218		3 PAG 496 (Ag Tech Expo)	1		
Program Elective		3 GEOG 470	3		
		Gen Ed Soc/Behavioral	3		
		16	14		1
Junior					
Fall	Credits	Spring	Credits		
ASM 354		3 PAG 454	3		
HNES 100, 111, 217, 250, ECON 205, or PH 101		3 SOIL 210 or ANSC 223	3		
PAG 315		3 STAT 330	3		
Program Elective		6 ENGL 320, 321, 324, or 459	3		
		Program Elective	3		
		15	15		
Senior					
Fall	Credits	Spring	Credits		
PAG 455		3 PAG 475:: Prec. Ag Systems (capstone)	2		
ASM 378		3 SOIL 322 or ANSC 240	3		
Gen Ed Hum/Fine Arts		3 Gen Ed Soc/Behavioral	3		
Program Elective		6 Program Elective	6		
		15	14		
Total Credits: 120					

Precision Agriculture

Department Information

- **Department Phone:**
701-231-7261
- **Department Email:**
ndsu.aben@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Credential Offered:**
B.S.

Major Requirements

Major: Precision Agriculture

Degree Type: Bachelor of Science (B.S.)

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
AGEC 242	Introduction to Agricultural Management	3
ASM 225	Computer Applications in Agricultural Systems Management	3
ASM 354	Electricity and Electronic Applications	3
ASM 378	Machinery Principles and Management	3
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CSCI 114	Computer Applications	3
or TL 116	Business Software Applications	
GEOG 105	Fundamentals of Geographic Information Systems	3
GEOG 455	Introduction to Geographic Information Systems	4
MATH 103	College Algebra	3
MATH 105	Trigonometry	3
PAG 115	Introduction to Precision Agriculture	2
PAG 115L	Introduction to Precision Agriculture Lab	1
PAG 215	Mapping of Precision Ag Data	3
PAG 315	Electronic Systems in Precision Ag	3
PAG 454	Applications of Precision Agriculture	3
PAG 455	Applications of Big Data in Precision Agriculture	3
PAG 475	Precision Ag Systems Capstone	2
PAG 496	Field Experience/Practicum (Precision Ag Tech Expo)	1
PAG 496	Field Experience/Practicum (Internship)	1
PLSC 110	World Food Crops	3
or ANSC 114	Introduction to Animal Sciences	
PLSC 225	Principles of Crop Production	3
or ANSC 220	Livestock Production	
PPTH 324	Introductory Plant Pathology	3
or ANSC 218	Anatomy and Physiology of Domestic Animals	
SOIL 210	Introduction to Soil Science	3
or ANSC 223	Introduction to Animal Nutrition	
SOIL 322	Soil Fertility and Fertilizers	3
or ANSC 240	Meat Animal Evaluation and Marketing	
STAT 330	Introductory Statistics	3
Precision Ag Major requires an additional 18 credits of elective credits. Choose from those listed below, or consult your advisor for additional options. ¹		18
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
AGEC 342	Farm and Agribusiness Management II	
AGEC 350	Agrisales	
ASM 264	Natural Resource Management Systems	
ASM 373	Tractors & Power Units	
ASM 374	Power Units Laboratory	
ASM 429	Hydraulic Power Principles and Applications	
BIOL 150	General Biology I	
BIOL 150L	General Biology I Laboratory	
CSCI 479	Introduction to Data Mining	
GEOG 456	Advanced Geographic Information Systems	
GEOG 470	Remote Sensing	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
ME 311	Introduction To Aviation	
ME 312	Introduction to Flight	

ME 313	Commercial Instrument Ground School	
NRM 420	Sustainable Scenarios in Natural Resources Management	
PLSC 215	Weed Identification	
PLSC 323	Principles of Weed Science	
PLSC 335	Seed Technology & Production	
PLSC 350	Sugarbeet Production	
PLSC 453	Advanced Weed Science	
PPTH 455	Plant Disease Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 410	Soils and Land Use	
SOIL 447	Microclimatology	
Total Credits		87

¹ In consultation with your advisor, courses not appearing on the list that are intended to be used in this area require a substitution form to be submitted to the Office of Registration and Records by the student's advisor during the term in which the student completes the course.

Minor Requirements

Minor: Precision Agriculture

Required Credits: 18

Code	Title	Credits
Required Courses		
PAG 115	Introduction to Precision Agriculture	2
PAG 215	Mapping of Precision Ag Data	3
Select 2 courses from the following:		6
PAG 315	Electronic Systems in Precision Ag	
PAG 454	Applications of Precision Agriculture	
PAG 455	Applications of Big Data in Precision Agriculture	
Elective Courses - Select 6 credits from the following:		6
AGEC 244	Agricultural Marketing	
AGEC 246	Introduction to Agricultural Finance	
AGEC 342	Farm and Agribusiness Management II	
AGEC 350	Agrisales	
ANSC 114	Introduction to Animal Sciences	
ASM 264	Natural Resource Management Systems	
ASM 354	Electricity and Electronic Applications	
ASM 378	Machinery Principles and Management	
ASM 429	Hydraulic Power Principles and Applications	
BIOL 150	General Biology I	
BIOL 150L	General Biology I Laboratory	
CSCI 479	Introduction to Data Mining	
GEOG 455	Introduction to Geographic Information Systems	
GEOG 456	Advanced Geographic Information Systems	
GEOG 470	Remote Sensing	
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	
ME 311	Introduction To Aviation	
ME 312	Introduction to Flight	
ME 313	Commercial Instrument Ground School	
PAG 315	Electronic Systems in Precision Ag *	
PAG 454	Applications of Precision Agriculture *	
PAG 455	Applications of Big Data in Precision Agriculture *	
PLSC 225	Principles of Crop Production	
NRM 453	Rangeland Resources Watershed Management	

SOIL 217 Introduction to Meteorology & Climatology

SOIL 322 Soil Fertility and Fertilizers

Total Credits

17

* May take as an elective if not taken as one of the two courses from the required section.

Professional Selling

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/mm/ (<http://www.ndsu.edu/business/departments/mm/>)
- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/professional-selling/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/professional-selling/>)

Certificate in Professional Selling

The Certificate in Professional Selling develops student knowledge and competencies related to the sales profession, with particular emphasis on key interpersonal and selling skills. The program focuses on concepts and tools that are consistent with current professional practice.

Prospective students are subject to the university's admission policies and procedures. Certificates must be declared within and approved by the College of Business. Declare your certificate by completing the Certificate in Professional Selling Form (https://www.ndsu.edu/business/research/centers_institutes/sales_center/). Please do so *before or when* taking MRKT 430 Sales and Personal Selling.

Professional Selling

Department Information

- **Department Location:**
Richard H. Barry Hall
- **Department Phone:**
701-231-8651
- **Department Web Site:**
www.ndsu.edu/business/departments/mm/ (<http://www.ndsu.edu/business/departments/mm/>)
- **Credential Offered:**
Certificate
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/professional-selling/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/professional-selling/>)

Certificate Requirements

Certificate: Professional Selling

Required Credits: 16

Code	Title	Credits
Requirements		
MRKT 320	Foundations of Marketing	3
MRKT 430	Sales and Personal Selling *	3
MRKT 434	Sales Management	3
MRKT 436	Advanced Professional Selling	1
MRKT 497	FE/Coop Ed/Internship	3

Electives - Select one of the following:

3

AGEC 350	Agrisales
MGMT 451	Negotiation and Alternative Dispute Resolution
MGMT 461	Supply Chain Management
MGMT 462	Modeling the Supply Chain
MRKT 438	Customer Relationship Management (CRM) and Sales Technology
MRKT 470	Services Marketing

Total Credits**16**

* Optional co-requisite with MRKT 320

Requirements for a certificate in Professional Selling

- Certificates must be declared within the College of Business. Be sure to officially declare your certificate by completing the Certificate in Professional Selling form (https://www.ndsu.edu/business/research/centers_institutes/sales_center/). Please do so *before or when* taking MRKT 430 Sales and Personal Selling.
- To be accepted into the certificate program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits).
- To complete a certificate, students must earn a 'C' or better in all courses used to satisfy certificate requirements and a minimum 2.50 grade point average that is based on the courses used to satisfy the certificate requirements.
- If the certificate or institutional GPA falls below the 2.50 GPA after acceptance into the program, the student will not be allowed to register for the CoB courses until the cumulative GPA returns to 2.50 or above.
- Certificate students must satisfy all course prerequisites.
- Approval for a certificate does not guarantee enrollment in specific courses.

Psychology

Department Information

- **Department Location:**
Minard Hall 232
- **Department Phone:**
701-231-8622
- **Department Email:**
ndsu.psychology@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/psychology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/psychology/>)

Whether you're interested in psychology as a helping profession or as the science of mind and behavior, the Department of Psychology at North Dakota State University is an exciting place to be. For the last several years, our programs have grown to build on our strengths in health psychology and cognitive neuroscience. Our expanded faculty and graduate programs mean that our undergraduate majors have ample opportunities for participating in cutting-edge research and course work.

Background Information

Psychologists study a broad range of thought and behavior, from normal to abnormal, in both individuals and social groups. What distinguishes psychology from other fields is its strong research orientation. Because psychology is relevant to virtually all professions, students who plan to enter professions such as medicine, law, business management, social work, education or counseling often elect to major or minor in psychology.

Career Opportunities

Most professional positions for psychologists require a master's or doctoral degree. In addition to pursuing graduate work in psychology, recent graduates have entered professional programs in medicine, counseling and guidance, business, special education, social work, law, dentistry, ministry and optometry.

Many of our students seek employment immediately after completing their bachelor's degree. Employers seek out psychology majors for their combination of people and research skills. Some of our graduates have entered positions directly related to psychological services (e.g., mental health aide, psychological testing technician, behavior analyst, or medical research assistant). Others have taken positions not directly concerned with

psychological services but related to psychology (e.g., sales, management, law enforcement, corrections, advertising, market research and statistical consulting).

Alumni surveys by the NDSU Career Center have consistently shown that our graduates are very successful in obtaining good jobs or going on to graduate or professional school.

The Program

Undergraduate students can either major or minor in psychology at NDSU. Students majoring in psychology may pursue either a Bachelor of Arts (B.A.) or a Bachelor of Science (B.S.). The primary difference between the two degree programs is that the B.A. degree requires competency at the second-year level of a foreign language while the B.S. requires an approved minor or additional course work in either the natural sciences or the social sciences instead of a language. Both the major and minor requirements within psychology allow each student to select the courses most relevant to his or her own interests.

Advising

Freshman and transfer students receive introductory academic advising from the department's professional advisor in conjunction with NDSU's Career and Advising Center. This preparatory advising continues until students are assigned to a faculty advisor to start their junior year. In addition to these professional and faculty advisors, students can use our web-based advising center to obtain information about the psychology curriculum and career planning. Printed handouts with this information are also available from the department.

One helpful feature is the Career Orientation OverLay (COOL), which has been developed to aid students in selecting courses relevant to their career goals. COOLs are available for behavioral neuroscience (e.g., medicine, medical research), industrial psychology (e.g., business, industry), human services (e.g., clinical psychology, social work), and experimental psychology (e.g., academic and research careers).

Research and Computing Facilities

Students and faculty at NDSU are engaged in research on a wide variety of topics in psychology. Research laboratories include experimental rooms for human research, sound-attenuated chambers, a group lab suite, a virtual reality display system and a driving simulator. Laboratory facilities include advanced equipment for studying human perception, brain function, information processing and social interaction.

Because the program at NDSU emphasizes the scientific approach to the study of behavior, student research is strongly encouraged. Undergraduate students often serve as research assistants working closely with faculty and graduate students. Current research includes projects on health, vision, virtual reality/multi-sensory integration, information processing, behavior modification, emotion, depression, history of psychology, and group processes.

Field Experience

The department maintains excellent relations with a number of service agencies in the Fargo-Moorhead community. Through these contacts, psychology majors can gain field experience in human service settings. At the same time, they earn college credit and gain an understanding of the applications of psychological principles in community service agencies.

Financial Aid

Research and teaching assistantships are sometimes available to advanced undergraduate students. Students can also receive support for work in the department through the NDSU work-study program. In addition, the Psychology Research Award Fund provides money to undergraduates for research projects and travel to professional conferences.

Some scholarships are available for undergraduates. For example, the Patricia Beatty Scholarships provide funding for one to two junior and senior psychology students each year. Students are invited to apply for these scholarships, which are awarded based on grade point average and involvement in department research and activities. Many of our students also have participated in campus-wide programs that sponsor students to do research with faculty mentors (for example, the McNair Scholars program).

High School Preparation

Basic college preparatory courses in high school are sufficient for NDSU psychology majors. Since research and writing skills are particularly important, students should be well-grounded in English, science, social science, and mathematics. Do not be concerned if you have not had psychology in high school—you will get plenty of courses here. In fact, we generally prefer that students take their introductory psychology course at NDSU rather than Advanced Placement Psychology in high school.

Requirements for Majors

A total of 51 semester credits are required in psychology and must include PSYC 111 (Introduction to Psychology), PSYC 350 and 351 (Research Methods I and II) and 15 credits at the 400-level from a selection of courses. Students also are required to complete general education requirements, which include our required courses of MATH 103 (College Algebra) or higher and ENGL 324, 325, or 459 for Upper Division Writing, and a capstone experience course.

Psychology Minors

A total of 18 credits are required in psychology and must include PSYC 111 (Introduction to Psychology) and one 300 or 400-level course. In addition to general psychology minors, more specialized minors are available in neuroscience and managerial psychology.

B.S. in Behavioral Statistics

This interdisciplinary major is the result of a joint effort between the Departments of Psychology and Statistics. (Note: students in this major also complete the requirements for a degree in psychology.) Graduates of this program will have skills in collecting and analyzing data on human behavior, and would be employable in firms that deal with medical or Medicare data, consumer activity, market research, etc. See the psychology web site, your advisor or the *NDSU Bulletin* for detailed information.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
MATH 103 or 104 (R) or Higher		3 Humanities & Fine Arts Gen Ed	3
PSYC 111		3 Any 200 level PSYC class	3
Science & Technology Gen Ed		3 Science & Technology w/Lab Gen Ed	4
Social & Behavioral Sciences Gen Ed		3 Social & Behavioral Science/Global Perspective Gen Ed	3
PSYC 189		1	
		16	16
Sophomore			
Fall	Credits	Spring	Credits
STAT 330		3 PSYC 351	3
200 level PSYC		3 COMM 110	3
PSYC 350		3 Humanities & Fine Arts/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed		3 Supporting track or minor	3
Wellness Gen Ed		2 Elective	4
		14	16
Junior			
Fall	Credits	Spring	Credits
Elective		3 400 level PSYC class	3
PSYC Elective		3 400 level PSYC class	3
Supporting track or minor		3 Supporting track or minor	3
Supporting track or minor		3 Supporting track or minor	3
ENGL 324, 325, or 459		3 Elective	3
		15	15
Senior			
Fall	Credits	Spring	Credits
400 level PSYC class		3 400 level PSYC	3
400 level PSYC class		3 PSYC 480 or 489 (Capstone Experience) ¹	3
Supporting track or minor		3 Supporting track or minor	3
Elective		3 Elective	4

Elective	3	
	15	13

Total Credits: 120

¹ Capstone: Student can take either PSYC 480 or PSYC 489 or select one course from ALL 4 of the Core Groups (A-D).

Degree Notes:

- Students earning a Bachelor of Science degree must select one of the three tracks (Natural Science, Social Science or Minor Program of Study) in consultation with an adviser (14 credit minimum).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
MATH 103 or 104 (R) or Higher		3 Humanities & Fine Arts Gen Ed	3
PSYC 111		3 Any 200 level PSYC class	3
Science & Technology Gen Ed		3 Science & Technology w/Lab Gen Ed	4
Social & Behavioral Sciences/Global Perspectives Gen Ed		3 Social & Behavioral Sciences Gen Ed	3
PSYC 189		1	
		16	16
Sophomore			
Fall	Credits	Spring	Credits
STAT 330		3 PSYC 351	3
200 level PSYC		3 COMM 110	3
PSYC 350		3 Humanities & Fine Arts/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed		3 Modern Language 102	4
Modern Language 101		4	
		16	13
Junior			
Fall	Credits	Spring	Credits
Elective		3 400 level PSYC class	3
PSYC Elective		3 400 level PSYC class	3
Wellness Gen Ed		2 Modern Language 202	3
Modern Language 201		3 Elective	3
ENGL 324, 325, or 459		3 Elective	3
		14	15
Senior			
Fall	Credits	Spring	Credits
400 level PSYC class		3 400 level PSYC	3
400 level PSYC class		3 PSYC 480 or 489 (Capstone Experience) ¹	3
Elective		3 Elective	3
Elective		3 Elective	3

Elective	3 Elective	3
	15	15

Total Credits: 120

¹ Capstone: Student can take either PSYC 480 or PSYC 489 or select one course from ALL 4 of the Core Groups (A-D).

Degree Notes:

- Students earning a Bachelor of Arts degree must complete the Modern Foreign Language proficiency (3-14 credits).

Psychology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8622
- **Department Web Site:**
www.ndsu.edu/psychology/ (<http://www.ndsu.edu/psychology/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/psychology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/psychology/#planofstudytext>)

Major Requirements

Major: Psychology

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2

Cultural Diversity (D) ****Global Perspectives (G) ****

Total Credits	39
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* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Major Requirements

Code	Title	Credits
Psychology Major Requirements		
PSYC 111	Introduction to Psychology (Cannot be used to satisfy general education category B)	3
PSYC 189	Skills for Academic Success ¹	1
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC	Electives	6
Psychology 400 Level Electives:		9
Select one course from 3 of the following 4 groups (A-D)		
Group A: Social/Personality:		
PSYC 453	Organizational Psychology	
PSYC 468	Personality	
PSYC 470	Experimental Social Psychology	
Group B: Perception/Cognition:		
PSYC 460	Sensation & Perception	
PSYC 461	Memory And Knowledge	
PSYC 464	Attention & Thinking	
Group C: Biological Bases of Behavior:		
PSYC 465	Psychobiology	
PSYC 481	Health Psychology	
PSYC 486	Neuropsychology	
Group D: Individual Differences:		
PSYC 463	Experimental Developmental Psychology	
PSYC 471	The Psychology Of Aging	
PSYC 472	Advanced Psychopathology	
PSYC 473	Child Psychopathology and Therapy	
Capstone Experience: Select PSYC 480 or PSYC 489 or have completed one course from each of the four Core groups (A-D):		3
PSYC 480	History & Systems	
PSYC 489	Honors Thesis	

PSYC 400 Level Elective	3
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May include PSYC 493 (Undergraduate Research) or PSYC 496 (Field Experience) courses taken for a grade.

Other Required Courses

ENGL 324	Writing in the Sciences (May satisfy general education category C)	3
or ENGL 325	Writing in the Health Professions	
or ENGL 459	Researching and Writing Grants and Proposal	
MATH 103	College Algebra (or higher level)	3

Track Elective	14-16
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Students earning a Bachelor of Science degree must select one of the three tracks listed below in consultation with an adviser (14 credit minimum).

Total Credits	51-53
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Code	Title	Credits
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Track: Natural Science	14
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14 additional credits in math/science. Prefixes accepted include: BIOL, BIOC, BOT, CHEM, ENT, GEOL, MATH, MICR, PHYS, PLSC, STAT, OR ZOO. Courses selected for this track cannot count for general education.

Code	Title	Credits
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Track: Social Science	14
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14 additional credits in social sciences (excluding PSYC prefix courses). Prefixes accepted include: ANTH, CJ, ECON, POLS, SOC or HDFS general education courses or courses that include an HDFS general education prerequisite. Courses selected for this track cannot count for general education.

Other courses accepted include:

COMM 114	Human Communication
COMM 212	Interpersonal Communication
COMM 216	Intercultural Communication
COMM 260	Introduction to Web Design
COMM 271	Listening and Nonverbal Communication
COMM 301	Rhetorical Traditions
COMM 402	Contemporary Rhetoric
COMM 435	Critical Approaches to Popular Culture
COMM 436	Issues in Mass Communications
COMM 450	Issues in Communication
COMM 480	Health Communication II
BUSN 487	Managerial Economics
MGMT 320	Foundations of Management
MGMT 330	Foundations of Organizational Behavior
GEOG 151	Human Geography
GEOG 161	World Regional Geography
GEOG 262	Geography of North America

Code	Title	Credits
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Track: Minor Program of Study	16+
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A minor in an approved area of study.

¹ PSYC 189 is only required for first-time, first-year students—A first-time, first-year student is defined as a student who has not yet completed a college course as a college student. Students that are not first-time, first-year students that either transfer into the university or change their major are not required to take PSYC 189.

Program Notes

- Students earning a Bachelor of Arts degree must complete the Modern Foreign Language proficiency (3-14 credits).
- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.
- When a student selects psychology as a second major, the student will not have to complete the track elective.

Minor Requirements

Minor: Psychology

Required Credits: 18

Code	Title	Credits
Required Courses		
PSYC 111	Introduction to Psychology	3
PSYC Electives	At least one course must be a 300-400 level course	15
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Courses cannot be taken P/F.

Public Health

Department Information

- **Department Location:**
Aldevron Tower 6th Floor
- **Department Phone:**
701-231-6269
- **Department Web Site:**
www.ndsu.edu/publichealth/ (<http://www.ndsu.edu/publichealth/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/public-health/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/public-health/>)

The public health minor engages students in the history and philosophy of public health as well as its core values, concepts and functions across the globe and in society. The minor includes understanding of the socioeconomic, behavioral, and biological factors that impact human health and contribute to health disparities. Communication skills will be emphasized through writing, critical thinking, and other methods of oral and visual/electronic communication. The minor compliments many majors such as Emergency Management, Sociology, Microbiology, Exercise Science, Nutrition, and Psychology and is a compliment to pre-health majors. Completing a minor in public health is also a great introduction for students thinking about graduate school to attain a Master of Public Health (MPH).

The field of public health is growing and there is increasing demand for public health professionals as well as other professionals in health-related fields as identified by the U.S. Bureau of Labor Statistics. More specifically, employment in the areas of health education, epidemiology, and statistics are identified as having a growing employment need.

Public Health

Department Information

- **Department Location:**
Aldevron Tower 6th Floor
- **Department Phone:**
701-231-6269
- **Department Web Site:**
www.ndsu.edu/publichealth/ (<http://www.ndsu.edu/publichealth/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/public-health/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/public-health/>)

Minor Requirements

Minor: Public Health

Required Credits: 18

Code	Title	Credits
Minor Requirements		
PH 101	Introduction to Public Health	3

STAT 330	Introductory Statistics	3
PH 474	Epidemiology	3
SOC 235	Cultural Diversity	3
Select one from the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
Select one elective from the following:		3
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 445	Understanding Vulnerable Populations in Disasters	
HNES 200	Principles of Nutrition	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
POLS 215	Problems and Policies In American Government	
SOC 431	Environmental Sociology	

Total Credits**18**

Public History

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
bulletin.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/public-history/#planofstudytext>)

Major Requirements

Major: Public History

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		

Global Perspectives (G) ^{*†}**Total Credits****39**

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences**Degree Requirements**

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Thirty-three (33) credits of the major must be taken in residence at NDSU.

Code	Title	Credits
Core Requirements		
Select one history survey course from the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	
HIST 251	Introduction To Public History	3
HIST 252	Introduction to Museum Work	3
HIST 352	Museum Collections Management	3
HIST 390	Historical Research and Writing	3
HIST 401	Archival Theory and Practice	3
HIST 403	Archival Preservation	3
HIST 404	Digital History	3
HIST 415	Public Memory and Memorialization in America	3
HIST 489	Senior Seminar (Capstone)	3
HIST 496	Field Experience (Approved Internship)	9
Distribution Requirement: Minimum credit required for each distribution area.		

U.S. History: Select 6 credits from the following: 6

RELS 340	New Religious Movements
RELS 345	Religion and Politics
HIST 382	Canada
HIST 420	Colonial American History
HIST 422	American Civil War and Reconstruction
HIST 423	The Gilded Age and Progressive America
HIST 424	U.S. History 1917-1960
HIST 425	U.S. History 1917-Present II
HIST 426	Women in American History
HIST 428	War and Society in Early America
HIST 431	The North American Plains
HIST 434	Environmental History
HIST 436	American Frontier to 1850
HIST 437	American West Since 1850

Non U.S. History: Select 6 credits from the following: 6

HIST 320	History of Christianity (May satisfy general education category A and G)
HIST 355	History of Global Islam
HIST 381	Australia & New Zealand
HIST 440	The Ottoman Empire
HIST 450	Ancient History
HIST 451	Medieval History
HIST 454	Renaissance And Reformation
HIST 455	The Eighteenth Century
HIST 456	Europe 1815-1914
HIST 457	Europe Since 1914
HIST 464	Imperial Spain
HIST 465	Germany since 1750
HIST 467	History Of Russia II
HIST 473	Colonial Mexico
HIST 474	Modern Mexico
HIST 477	Slavery in the Atlantic World
HIST 480	History of Modern China from 1600
HIST 481	History of Japan
HIST 482	Vietnam: 125 Years of Conflict
HIST 484	Cultures and Civilizations of the Pre-modern World
HIST 485	Cultural Exchange and the Making of the Modern World

Total Credits

51

Public History

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
www.ndsuhprs.org/ (<http://www.ndsuhprs.org/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/public-history/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/public-history/>)

Do you like to study history but wonder what you can do with a history degree? If so, the public history program at North Dakota State University may be for you. Public history is an umbrella field that encompasses archival work, museum studies, collections management, historic preservation, cultural resource management, and many other public facing historical professions. This innovative program exposes undergraduates to "doing" history. It provides students with the opportunity to explore a variety of careers and prepares them for employment or graduate school in the expanding field of public history. Examples of opportunities for public history majors include employment in historical societies, museums, archives, historic preservation, corporations, municipalities, labor and farm organizations, and state and federal government agencies.

THE PROGRAM

The core of the major is 51 credits, which consists of a well-integrated combination of courses designed to provide students with training in history and in the specific field of public history. The goal of the program is to provide a structured framework of courses and allowance for some flexibility to reflect personal interests. The public history major provides students with a solid foundation in history content and methodology and introduces them to the sub-fields of public history. A crucial part of the program is an approved internship of nine credit hours at a historical agency, often at local museums such as Bonanzaville in West Fargo or the Historical and Cultural Society of Clay County at the Hjemkomst Center in Moorhead, Minnesota. The internship is an opportunity for practical, on-the-job experience in public history.

CAREER OPPORTUNITIES

Recent graduates in public history are employed at the State Historical Society of North Dakota, the National Park Service, and at several regional county museums and historic sites. Currently, the U.S. Department of Labor predicts that openings at public history sites is "projected to grow 9 percent from 2018 to 2028, faster than the average for all occupations." Further information on career opportunities can be found in the *Occupational Outlook Handbook* published by the U.S. Department of Labor. Some students decide to pursue further graduate study after completing a public history degree at NDSU. Several of our recent graduates have been admitted to leading graduate public history programs such as the Cooperstown Museum Studies Program and Middle Tennessee State University.

THE CURRICULUM

Students begin with 9 to 15 credits at the 100-200 level to provide a foundation for their later work. Public history courses at the 200 level may be used to meet this requirement. Year-long survey courses in U.S. history and Western Civilization are provided to give students a basic knowledge of the history of the United States and of the wider cultural heritage of the western world. After completing 100-200 level courses, students complete a course on historical research and writing. At the junior or senior level, students take a sequence of courses in American, European, and world history. These courses provide students with in-depth historical content. Courses in museum collections management, digital history, and public memory and memorialization are also required. The resources of the North Dakota Institute for Regional Studies at the NDSU Archives are used in these classes. Three to nine more credits of history at the junior or senior level are required to gain further historical knowledge; these courses are chosen after consultation with an advisor. A three-credit senior seminar is required of all history majors as a capstone experience.

Courses such as introduction to public history, museum studies, collections management, and digital history are designed to instill knowledge of specific areas in public history. The introduction to public history course provides an overview of the field and an opportunity to create a public history project. The museum studies course familiarizes students with the theory and practice of museum work and provides experience creating an exhibit. The collections management course focuses on the care and management of museum collections. These courses and the required historical content courses provide students with an understanding of cultural, political, social and economic changes through time and teach students how to craft an interpretation of those changes.

Finally, a nine-credit internship provides practical experience in the field of public history. The State Historical Society of North Dakota (and other local and regional historical agencies) provide opportunities in areas such as collections management, archival work, historical editing, historical preservation, and interpretation of historic sites.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
HIST 101 or 103		3 COMM 110	3
ENGL 120		3 HIST 102 or 104	3
GE Social Science Req.		3 GE Social Science Req.	3
GE Science/Technology Req.		3 GE Science/Technology	3

Minor/Elective	3	GE Science/Technology Lab	1
		Minor or Free Elective	3
	15		16

Second Year			
Fall	Credits	Spring	Credits
HIST 251		3 HIST 252 or 352	3
GE Science/Technology		3 AHSS Fine Arts Req.	3
AHSS Social Science Req.		3 US or Non-US History Req.	3
GE Wellness Req.		2-3 GE Quantitative Reasoning Req.	3
Minor/Elective		3 Minor/Foreign Language/Elective	3
	14-15		15

Third Year			
Fall	Credits	Spring	Credits
HIST 390		3 HIST 352 or 252	3
HIST 401		3 HIST 403	3
HIST 404		3 HIST 415	3
US or Non-US History Requirement		3 HIST 496	3
Minor/Foreign Language Req.		3 Minor/Foreign Language/Elective	3
	15		15

Fourth Year			
Fall	Credits	Spring	Credits
HIST 489		3 HIST 496	3
HIST 496		3 US or Non-US History Requirement	3
US or Non-US History Req.		3 Minor/Elective	3
Minor/ Foreign Language/Elective		3 Minor/Elective	3
Minor/Elective		3 Minor/Elective	3
	15		15

Total Credits: 120-121

Public Policy

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/public-policy/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/public-policy/>)

The minor in public policy program will provide students an inter-disciplinary array of classes that will introduce them to the field of public policy/public administration. These classes will address skills such as assessments of public needs, the design and implementation of programs and policies to meet those needs, and the evaluation of those programs and policies.

Public Policy

Department Information

- **Department Location:**
Putnam Hall
- **Department Phone:**
701-231-8567
- **Department Web Site:**
www.ndsu.edu/politicalscience/ (<http://www.ndsu.edu/politicalscience/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/public-policy/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/public-policy/>)

Minor Requirements

Public Policy Minor

Required Credits: 18

Code	Title	Credits
Core Courses		
POLS 215	Problems and Policies In American Government	3
POLS 420	Political Behavior-Executive-Legislative Process	3
or POLS 422	State and Local Politics	
or POLS 423	Public Policy Analysis	
POLS 442	Global Policy Issues	3
or POLS 450	Politics of the Developing Countries	
or POLS 452	Comparative Political Economy	
Additional Public Policy Related Courses: Choose 3 classes from the following		9
COMM 383	Organizational Communication I	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 445	Understanding Vulnerable Populations in Disasters	
SOC 115	Social Problems	
SOC 116	Global Social Problems	
SOC 233	Sociology of Organizations and Work	
SOC 405	Community Development	
SOC 410	Social Inequality	
HDFS 353	Children, Families and Public Policy	
HDFS 480	Community Resources of Later Life	
POLS 420	Political Behavior-Executive-Legislative Process *	
POLS 422	State and Local Politics *	
POLS 423	Public Policy Analysis *	
POLS 442	Global Policy Issues *	
POLS 450	Politics of the Developing Countries *	
POLS 452	Comparative Political Economy *	
POLS 496	Field Experience	
Total Credits		18

* If not used above in the core courses or in the Political Science major.

Program Notes:

- Political Science majors cannot take courses in this minor that were used to satisfy major requirements.

Publishing

Department Information

- **Credential Offered:**
Certificate
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/publishing/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/publishing/>)

The certificate in publishing will prepare students to work within the unique framework of the publishing industry. The top five skills employers seek among college graduates: communication, problem solving, ability to work in a team, project management, and quantitative skills (Job Outlook Survey 2019, Nat'l Assoc. of Colleges and Employers). The certificate in publishing delivers an educational experience that allows students to learn about the history and practice of publishing scholarly and literary works. The course work offers in-depth, real-life experience with a decades-old publishing house, applying current methods and customs of scholarly and literary publishing while meeting real-time production deadlines and schedules in preparation for national distribution of North Dakota State University Press books. The key topics for the certificate in publishing are the same as described in the Classification of Instructional Programs for publishing: focusing on the process of managing the creation, publication, and distribution of print and electronic books and other text products, and preparing individuals to manage the editorial, technical, and business aspects of publishing operations. The certificate in publishing includes instruction in product planning and design, editing, author relations, business and copyright law, publishing industry operations, contracting and purchasing, product marketing, electronic publishing and commerce, history of publishing, and professional standards and ethics.

Publishing

Department Information

- **Credential Offered:**
Certificate
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/publishing/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/publishing/>)

Certificate Requirements

Publishing Certificate

Required Credits: 12

Code	Title	Credits
AHSS 472	Introduction to Publishing	3
AHSS 476	Practicum in Publishing	3
AHSS 496	Field Experience	3
Additional Requirement *		3
Total Credits		12

- * Additional requirement coursework to be determined in collaboration with a student's goals and the program coordinator. Experiences related to the field of publishing, such as contemporary literature, graphic design, marketing & publicity, bookkeeping, editing, digital history, etc. The department will need to submit a substitution form to the Office of Registration and Records in order for it to apply to this certificate since it is an undefined additional requirement.

Radiologic Sciences

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**

B.S.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/radiologic-sciences/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/radiologic-sciences/>)

Radiologic Sciences at North Dakota State University combines foundational science, math, and general education courses on campus with applied imaging classroom, lab, and clinical education during a two-year full-time internship within an affiliated hospital. Three unique and specialized internships available to RS majors are radiography, diagnostic medical sonography, and echocardiography.

Background Information

Radiographers, also known as **radiologic technologists**, perform diagnostic imaging examinations, accurately position patients, obtain quality diagnostic images, and adhere to radiation protection regulations for themselves, their patients, and coworkers. They work closely with radiologists, the physicians who interpret medical images, to diagnose or rule out disease or injury. Radiologic technologists are educated in anatomy, patient positioning, examination techniques, equipment protocols, radiation safety, radiation protection and basic patient care. To become a registered radiologic technologist, RT(R), students must complete an accredited educational program, earn an academic degree, and pass a national certification examination. To remain registered, they must earn continuing education credits.

Radiologic technologists work in hospitals, physician offices and clinics, or diagnostic imaging centers. Multi-skilled RT(R)s who are educated and credentialed in more than one type of imaging technique are most marketable. With experience and additional training, general radiographers may become specialists in CT, magnetic resonance imaging, mammography, interventional radiography, or advance into management or education. Radiation therapy, sonography, and nuclear medicine typically require additional specialized formal education in a dedicated training program. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics (<https://www.bls.gov/ooh/healthcare/radiologic-technologists.htm>), employment of radiologic technologists is expected to grow faster than average for all occupations through 2026. An increase in medical conditions among the aging baby-boom population will require imaging as a tool to making diagnoses. Mean annual earnings for radiologic technologists in 2019 was \$62,280 (Radiologic and MRI Technologists : Occupational Outlook Handbook : U.S. Bureau of Labor Statistics (bls.gov) (<https://www.bls.gov/ooh/healthcare/radiologic-technologists.htm>))

Sonographers use special equipment and high frequency sound waves (ultrasound) to obtain images of internal body structures and organs. They have a high level of patient interaction and play a vital role in providing the physician with quality images to interpret, assess, and diagnose medical conditions or conduct surgical procedures. Two options for NDSU students interested in sonography are echocardiography and diagnostic medical sonography. **Echocardiographers**, also known as cardiac sonographers, evaluate the anatomy and hemodynamics (blood flow) of the heart, its chambers and valves, and related blood vessels. **Diagnostic medical sonographers** evaluate abdominal structures like the kidney, liver, and spleen, breast tissue, the reproductive system, blood vessels, fetal development, and musculoskeletal structures like tendons and joints. Sonographers are educated in anatomy and pathophysiology, patient positioning, examination techniques, equipment protocols, and basic patient care and safety. To become registered, students must complete an accredited educational program and pass national certifying examinations. To remain registered, they must earn continuing education credits.

Sonographers work in hospitals, physician offices, and medical and diagnostic laboratories. Currently there are job openings throughout the country. According to the U.S. Department of Labor Bureau of Labor Statistics (<https://www.bls.gov/ooh/healthcare/diagnostic-medical-sonographers.htm>), the demand for sonographers will continue to grow much faster than average for all occupations through 2026. This demand is attributed to the likelihood that the need to diagnose medical conditions within an aging baby-boom population will increase, as well as, the continued need for ultrasound as an alternative to imaging that involves radiation. Mean annual wages for diagnostic medical sonographers in 2019 was \$68,750 (Diagnostic Medical Sonographers and Cardiovascular Technologists and Technicians, Including Vascular Technologists : Occupational Outlook Handbook : U.S. Bureau of Labor Statistics (bls.gov) (<https://www.bls.gov/ooh/healthcare/diagnostic-medical-sonographers.htm>))

The Program

A Bachelor of Science degree, major in Radiologic Sciences, includes two or more years of rigorous academic courses on campus followed by a two-year full-time professional-level internship in an affiliated hospital-based program. RS students must have an interest and aptitude in the sciences and math and a strong desire to work directly with patients. Academic courses include chemistry, physics, anatomy and physiology, microbiology, trigonometry, psychology, statistics, and computer sciences, in addition to general education courses. Students pursuing any one of the three specializations in radiography, echocardiography, or diagnostic medical sonography will complete the same pre-radiologic sciences college courses. Transfer students must complete a minimum of 12-20 resident credits at NDSU prior to start of the internship. Residency requirements vary by RS specialization. During their final year of courses on campus, qualified students will apply for the two-year internship. The internship class and clinical education prepares the graduate to work in their respective area of specialization in radiography, diagnostic medical sonography, or echocardiography. College courses and the internship classes, lab, and clinical education constitute the four-year degree awarded by NDSU. Radiography graduates are eligible to take the national certifying exam administered by the American Registry of Radiologic Technologists (<https://www.arrt.org/>) to earn the RT(R) credential. Sonography graduates are eligible to take national certifying exams appropriate to their specialization and administered by the American Registry for Diagnostic Medical Sonography (<http://www.ardms.org/Pages/default.aspx>).

Internship Application and Admission

The internship application process begins annually in the fall. Internship admission is competitive. Admission criteria are established in collaboration with affiliated hospital programs and generally includes successful completion of all college courses on campus with a minimum grade of C, grade

point averages (a minimum of 2.50-3.00 is required and varies by hospital program), references, related experience, interview and ability to meet program-designated technical standards, or request accommodations to execute those skills. Technical standards include a sound intellect and emotional health to exercise good judgement even in emergencies, visual and hearing acuity, physical abilities to lift and position patients, pull, push, carry equipment, enter data, stand and walk for extended periods of times and communicate effectively. In addition, students must also comply with criminal background and student conduct requirements.

Radiography. Pre-RS students who apply and are accepted into the radiography internship will complete their applied classroom and clinical education in one of the following affiliated hospital-based radiologic technology programs: Avera McKennan Hospital (Sioux Falls, SD), Mercy/St Luke's Hospitals (Cedar Rapids, IA), Sanford Medical Center (Bismarck and Fargo, ND, Sioux Falls, SD), St. Cloud Hospital (St. Cloud, MN), St. Luke's College (Sioux City, IA), UnityPoint Health (Des Moines, IA), and the Veteran Affairs Medical Center (Minneapolis, MN). Affiliated hospital programs maintain programmatic accreditation through the Joint Review Committee on Education in Radiologic Technology (<https://www.jrcert.org/>). Internship classes and clinical experience will focus on patient care, anatomy and physiology, radiation physics and protection, imaging principles, positioning, radiobiology, and pathology.

Sonography. Pre-RS students who apply and are accepted into one of the sonography specializations will complete the 21-month internship offered by Sanford Medical Center Fargo. Internship classes, scanning labs, and clinical experience for echocardiography will focus on adult echocardiography with rotations in pediatric and stress echo. Internship classes, scanning labs, and clinical experience in diagnostic medical sonography will focus on abdomen, OB/GYN, small parts, and vascular sonography. SMCF's sonography programs are accredited by the Commission on Accreditation of Allied Health Education Programs (<https://www.caahep.org/>).

It is highly recommended that students interested in an RS major meet with the RS advisor at least one year prior to anticipated internship application to discuss areas of specialization, internship admission, and create a plan of study for successful completion of degree requirements. Information about the RS professions and specializations, curriculum, internship, and advising contacts are available from the NDSU Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences/>).

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
CHEM 117		3 BIOC 260	4
CHEM 117L		1 COMM 110	3
CHP 190		2 Humanities & Fine Arts (A)/ Cultural Diversity (D)	3
CSCI 114		3 MICR 202	2
ENGL 110*		3 MICR 202L	1
MATH 105		3 PSYC 111	3
Wellness		2 ENGL 120*	3
	17		19
Second Year			
Fall	Credits	Spring	Credits
BIOL 220		3 BIOL 221	3
BIOL 220L		1 BIOL 221L	1
Humanities & Fine Arts (A)		3 CHP 125	1
PHYS 211		3 PHRM 170	2
PHYS 211L		1 PHYS 212	3
RS 200		1 PHYS 212L	1
Social & Behavioral Sciences (B)/Global Perspectives (G)		3 Special Elective (dept. approved)	3
STAT 330		3 Special Elective (dept. approved)	3
	18		17

Third Year					
Fall	Credits	Spring	Credits	Summer	Credits
RS 496**		12-13 RS 496**		12-14 RS 496**	6-11
				Upper Division Writing (C; 300-400 level)	3
		12-13		12-14	9-14
Fourth Year					
Fall	Credits	Spring	Credits	Summer	Credits
RS 496**		12 RS 496**		12 RS 496**	1-6
		12		12	1-6
Total Credits: 129-142					

* All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

** RS 496 classroom, lab, and clinical education (internship) takes place within an affiliated hospital. The internship is full-time for 21-24 months, including summer. RS 496 courses and credits vary by radiography, echocardiography, or diagnostic medical sonography specialization.

Radiologic Sciences

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/radiologic-sciences/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/radiologic-sciences/#planofstudytext>)

Major Requirements

Radiologic Sciences Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 122

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Radiologic Science Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
RS 200	Introduction to Radiologic Sciences	1
RS 496	Field Experience	60
Professional education (internship) within an accredited affiliated school of radiologic technology includes the capstone experience.		
Related Courses Required:		
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S)	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab (May satisfy a general education category S)	4
CSCI 114 or TL 116	Computer Applications (May satisfy a general education category S) Business Software Applications	3
MATH 105	Trigonometry (or higher level)	3
Select one microbiology course and lab from the following:		3-5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
CHP 125	Medical Terminology for Health Professionals	1
PHRM 170	Common Medicines & Diseases	2
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
PSYC 111	Introduction to Psychology (May satisfy a general education category B)	3

STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Special Major Elective (department approved)		
Select one of the following:		3
PHIL 210	Ethics	
SOC 417	Sociology of the Family	
SOC 426	Sociology of Medicine	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 380	Health Communication I	
COMM 381	Patient-Provider Communication	
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		108-110

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Radiologic Sciences advisor for more information.

Range Science

Department Information

- **Department Location:**
Scholl of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/ (<http://www.ndsu.edu/snrs/degrees/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/range-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/range-science/>)

Rangeland livestock production focuses on the management of rangelands and grasslands for optimum livestock production and environmental benefits for society. Students will cover land management fields, the work of agencies and the private sector, as well as ranching operations. Rangeland ecology focuses on the broad study of native, non-forested ecosystems that cover more than 50% of the earth's land. These areas are managed as natural ecosystems to provide services that can benefit society. This emphasis area will prepare students by covering a variety of ecological topics including wildlife management, grassland restoration, and fire ecology. Offered as a minor program of study only.

Range Science

Department Information

- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/ (<http://www.ndsu.edu/snrs/degrees/>)
- **Credential Offered:**
Minor

- **Program Overview:**

bulletin.ndsu.edu/programs-study/undergraduate/range-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/range-science/>)

Minor Requirements

Minor: Range Science

Required Credits: 16

Code	Title	Credits
Required Courses		
RNG 136	Introduction to Range Management	3
RNG 225	Natural Resource & Agro-Ecosystems	3
RNG 450	Range Plants	3
Select one of the following:		3
RNG 452	Managing Natural and Rangeland Resources using GIS	
RNG 453	Rangeland Resources Watershed Management	
RNG 460	Plant Ecology	
RNG 456	Ecological Restoration	3
or RNG 458	Grazing Ecology	
Elective Course: Seminar may be used to fulfill this elective.		1
Total Credits		16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Religious Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
www.ndsu.edu/history/ (<http://www.ndsu.edu/history/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/religious-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/religious-studies/>)

From 1932 to 1977 the School of Religion was independent from the University but in close association with it. Presently, the School of Religion continues as a part of the College of Arts, Humanities, and Social Sciences. A minor in religious studies is available. The minor consists of 18 credits of which 9 credits may be at the 100-200 level and 9 credits must be at the 300-400 level.

Religion

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8654
- **Department Web Site:**
ndsuhprs.org/ (<http://ndsuhprs.org/>)
- **Credential Offered:**

Minor

- **Program Overview:**

bulletin.ndsu.edu/programs-study/undergraduate/religious-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/religious-studies/>)

Minor Requirements

Minor: Religion

Required Credits: 18

Code	Title	Credits
Required Minor Courses		
RELS 100	World Religions	3
RELS 460	Theory and Methods of Religious Studies	3
RELS	300-400 level electives	6
RELS	Additional electives	6
Total Credits		18

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU.
- For advice on the distribution of electives consult with religious studies faculty members.

Reliability Engineering

Department Information

- **Department Location:**
Civil & Industrial Engineering 202
- **Department Phone:**
701-231-9818
- **Department Web Site:**
www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/reliability-engineering/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/reliability-engineering/>)

Students majoring in any engineering discipline are eligible and may choose a minor in Reliability Engineering. Reliability engineering focuses on assessment of product/system design for the dependability of a system or component to function under varying operating conditions for specified time periods. Fundamentally, it deals with the elimination or reduction of uncertainty and risks resulting in an improved reliability and reduction of failures. Cost elements of failed systems include costs of downtime, repair costs, idle personnel, warranty costs and the cost of maintaining spares and replacement inventory. Engineers must identify the cause of failures, correct the causes, and determine ways to deal with failures that have occurred, and ultimately change the design or design process to reduce the frequency of failures in new systems or components. Students completing a minor in Reliability Engineering will develop a better understanding of statistical analysis, reliability and risk modeling, failure analysis, and design testing and optimization tools. Major manufacturing employers are looking to hire engineers that have a better understanding of these tools and skill sets.

The Reliability minor requires completion of 18 credits of which at least 12 must be in addition to the credits applied to the major. There are 9 required courses and 9 elective courses. Interested students are encouraged to visit with relevant faculty in the IME Department for advice on course selection to best suit their career interests. Students must have a declared major in any of the engineering disciplines to elect a minor in Reliability Engineering.

Reliability Engineering

Department Information

- **Department Phone:**
701-231-7494
- **Department Web Site:**
www.ndsu.edu/coe/ (<http://www.ndsu.edu/coe/>)

- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/reliability-engineering/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/reliability-engineering/>)

Minor Requirements

Minor: Reliability Engineering

Required Credits: 18

Code	Title	Credits
IME 460	Evaluation of Engineering Data	3
IME 463	Reliability Engineering	3
IME 464	Reliability Analysis	3
Elective Credits: Select 9 credits from the following:		9
IME 450	Systems Engineering and Management	
IME 461	Quality Assurance and Control	
IME 465	Introduction to Machine Learning	
ME 332	Engineering Materials II	
ME 442	Machine Design I	
ME 472	Fatigue and Fracture of Metals	
ECE 341	Random Processes	
ECE 427	Packaging for Electronics	
or IME 427	Packaging for Electronics	
ECE 443	Communications I	
ECE 444	Applied Digital Signal Processing	
STAT 330	Introductory Statistics	
STAT 461	Applied Regression Models	
STAT 462	Introduction to Experimental Design	
Total Credits		18

MINOR NOTE:

- This minor is only available to students pursuing an engineering major.
- 12 of the 18 credits for this minor must be unique and cannot count toward requirements in the student's engineering major.

Respiratory Care

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/respiratory-care/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/respiratory-care/>)

Respiratory Care is an allied health profession that specializes in the evaluation, treatment, and education of patients with cardiopulmonary (heart-lung) disorders. Respiratory therapists (RTs) work closely with patients, physicians, nurses and other healthcare team members in critical care, emergency rooms, nurseries and pediatrics, medical units and home care. RTs' diverse responsibilities include patient assessment, medical gas

therapy, pulmonary hygiene, diagnostic testing, mechanical ventilatory and cardiovascular support, rehabilitation activities, and consulting with physicians to develop treatment plans.

Background Information

The practice of respiratory care encompasses activities in diagnostic evaluation, therapy, and education of the patient, family and public. Diagnostic activities include obtaining and analyzing sputum and blood specimens, performing breathing studies to determine if lung function is impaired, performing sleep disorder studies and interpreting the data obtained from these. Therapy includes administering medical gases and respiratory medications to alleviate breathing problems, initiating and managing mechanical ventilators, establishing and maintaining artificial airways, performing pulmonary hygiene procedures and cardiopulmonary rehabilitation activities. Education of the patient, family and public promotes knowledge of disease processes, therapy and wellness. These essential functions of the RT are practiced under qualified medical direction.

Career Opportunities

Graduates of the respiratory care program are eligible to complete a series of national examinations administered by the National Board of Respiratory Care that lead to the Registered Respiratory Therapist (RRT) credential. NDSU graduates have enjoyed excellent pass rates on these certifying exams. Most states require a license to practice respiratory care and use these examinations or verification of credentials for state licensing. To remain licensed, RTs may also be required to obtain continuing education credit. Graduates readily find employment in hospital, clinic and home care settings throughout the country. Additional career opportunities exist in management, education, sleep medicine, research, sales and public health. According to the U.S. Department of Labor Bureau of Labor Statistics (<https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm>), employment of respiratory therapists is expected to grow much faster than the average for all occupations through the year 2026. This increased demand is attributed to growth in the middle-aged and elderly populations that will increase the incidence of respiratory conditions, advances in preventing and detecting disease, and improved medications and sophisticated treatments. Mean annual wages (<https://www.bls.gov/oes/2018/may/oes291126.htm>) for respiratory therapists in 2019 was \$61,330 (Respiratory Therapists : Occupational Outlook Handbook: : U.S. Bureau of Labor Statistics (bls.gov) (<https://www.bls.gov/ooh/healthcare/respiratory-therapists.htm#tab-5>).

The NDSU/Sanford Respiratory Care Program

A Bachelor of Science degree with a major in respiratory care from North Dakota State University includes two to three years of academic courses and a 15-month professional-level internship at Sanford Medical Center Fargo. The NDSU/Sanford Respiratory Care program is accredited by the Commission on Accreditation for Respiratory Care (<https://coarc.com/>).

Academic courses include college algebra, chemistry, physics, anatomy and physiology, microbiology, psychology and computer science, in addition to general education courses. Transfer students need to successfully complete a minimum of 20 resident credits at NDSU prior to starting the internship. The full-time internship consists of lecture, lab and clinical education, which prepares the student to enter the profession of respiratory care.

Near the end of the internship, students design a specialty proposal for a focused clinical experience (RC 494, Individual Study). Common specialty areas include: neonatal/pediatric general or intensive care, adult general or intensive care, cardiopulmonary diagnostics, pulmonary rehabilitation or home care, education, and management.

Internship Admission

Admission to the internship is selective. Qualified students apply during the spring of the academic year during which they will complete all courses on campus. Admission is based upon successful completion of all internship prerequisites (20 resident credits at NDSU), cumulative and core course grade point averages (a minimum of 2.50 is required; the maximum number of core course attempts is two), related experience, references, an interview, and compliance with criminal background and student conduct requirements. In addition, students admitted to the NDSU/Sanford Respiratory Care Program must possess the ability to complete the entire curriculum which requires that the student meet designated technical standards, or request accommodations to execute these skills. Technical standards include cognitive, physical, motor and tactile abilities, visual acuity, and speaking, hearing and interactive requirements. A detailed list of technical standards are found in the Department of Allied Sciences handbook (<https://workspaces.ndsu.edu/fileadmin/alliedsciences/Handbook/Handbook2019.pdf>). Internship applications are available from the NDSU Department of Allied Sciences. Deadline for receipt of completed applications is March 1. An admission committee selects the interns.

It is highly recommended that students interested in the RC major meet with the respiratory care advisor to discuss degree requirements, internship admission, and create an individualized plan of study at least one year in advance of applying for the internship. Information about the profession, curriculum, internship, technical standards, and advising contacts are available from the Department of Allied Sciences. (<https://www.ndsu.edu/alliedsciences/>)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year					
Fall	Credits	Spring	Credits		
CHEM 121 [†]		3 CHEM 122 [†]	3		
CHEM 121L [†]		1 CHEM 122L [†]	1		
CHP 190		2 MICR 202 [†]	2		
CSCI 114		3 MICR 202L [†]	1		
ENGL 110 [*]		3 COMM 110	3		
MATH 103 [†]		3 ENGL 120 [*]	3		
Wellness (W)		2 PSYC 111	3		
		17	16		
Second Year					
Fall	Credits	Spring	Credits		
BIOL 220 [†]		3 BIOC 260 [†]	4		
BIOL 220L [†]		1 BIOL 221 [†]	3		
CHEM 240 [†]		3 BIOL 221L [†]	1		
RC 200		1 CHP 125 [†]	1		
Social & Behavioral Sciences (B)/Global Perspectives (G)		3 Humanities & Fine Arts (A)	3		
STAT 330		3 PHYS 120 [†]	3		
Humanities & Fine Arts (A)/Cultural Diversity (D)		3 Special Elective (dept. approved)	3		
		17	18		
Third Year					
Fall	Credits	Spring	Credits	Summer	Credits
RC 496 ^{**}		15 RC 496 ^{**}	15	RC 496 ^{**}	13
		15	15		13
Fourth Year					
Fall	Credits				
RC 496 ^{**}		8			
RC 494 ^{**}		4			
Upper Division Writing (C; 300-400)		3			
Special Elective (dept. approved)		3			
		18			

Total Credits: 129

* All students are required to successfully earn credit for Engl 110 and Engl 120. Enrollment is based on English Placement. Upon completion of Engl 120 with a "C" grade or higher, students will be awarded placement credit (4) for Engl 110.

** Credits earned while participating in the Sanford Medical Center Fargo RC internship. The internship is 15 months, including one summer session.

† Indicates "core" course. A minimum "core" course GPA of 2.50 is required. "Core" courses must be completed with a grade of "C" within two attempts.

Respiratory Care

Department Information

- **Department Location:**
Sudro Hall
- **Department Phone:**
701-231-8713
- **Department Web Site:**
www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/respiratory-care/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/respiratory-care/#planofstudytext>)

Major Requirements

Respiratory Care Major

Degree Type: B.S.

Minimum Degree Credits to Graduate: 126

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Respiratory Care Major Requirements		
CHP 190	Critical Thinking and Academic Success	2
RC 200	Introduction to Respiratory Care	1
RC 496	Field Experience	51
RC 494	Individual Study	4
Advanced clinicals including the capstone experience.		
Related Courses Required:		
BIOC 260 or BIOC 460	Elements of Biochemistry * Foundations of Biochemistry and Molecular Biology I	3 or 4
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory (May satisfy a general education category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II	4
Select a Chemistry Sequence: sequence depends on future educational goals		4 or 8
CHEM 117 & 117	Chemical Concepts and Applications and Chemical Concepts and Applications *	
CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory *	
CHP 125	Medical Terminology for Health Professionals *	1
PHRM 170	Common Medicines & Diseases	2
CSCI 114 or TL 116	Computer Applications (May satisfy a general education category S) Business Software Applications	3
MATH 103	College Algebra (or higher level; excluding MATH 104) *	3
PHYS 120	Fundamentals of Physics (May satisfy a general education category S) *	3
PSYC 111	Introduction to Psychology (May satisfy a general education category B)	3
STAT 330	Introductory Statistics (May satisfy a general education category R)	3
Select one microbiology course & lab from the following:		3-5
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	
MICR 350 & 350L	General Microbiology and General Microbiology Lab *	
Special Major Electives (department approved)		
Sociology: Select one of the following:		3
SOC 426	Sociology of Medicine	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
Communication: Select one of the following:		3
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	
COMM 380	Health Communication I	
COMM 381	Patient-Provider Communication	
COMM 383	Organizational Communication I	
CHP 400	Interprofessional Health Care Practice	
Total Credits		100-107

* These core courses have a maximum of two attempts allowed.

Degree Requirements and Notes

- All required courses must be completed with a grade of 'C' or above. All students must maintain a semester GPA of 2.0 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the College.
- Completion of the prerequisites does not guarantee a student internship. Selection of interns is competitive. Please consult your Respiratory Care advisor for more information.

Robotics

Department Information

- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/robotics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/robotics/>)

Robotics is a branch of engineering that combines mechanical engineering, electronics engineering, manufacturing engineering, computer science and other fields of engineering at different degrees. A minor degree in Robotics equips students with skills required for designing and construction of robot mechanisms; designing and development of electronic control systems using sensory feedback and information processing to generate robotic motions by various actuators; and programming and application of robots for carrying out tasks that would be regarded as dirty, dull and dangerous (DDD) to a human being.

Robotics

Department Information

- **Official Program Curriculum:**
bulletin.ndsu.edu/programs-study/undergraduate/robotics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/robotics/>)

Minor Requirements

Minor: Robotics

Required Credits: 18

Code	Title	Credits
Part One - Core Content Areas: Nine (9) credits of core courses are aligned in four areas:		
1) Robotics Principles Area (Required)		
PREFIX	Introduction to Robotics	3
Take six credits (two courses) from any two of the remaining core areas.		6
2) Core Programming Area		
CSCI 122	Visual BASIC	
CSCI 277	Introduction to UNIX	
ECE 173	Introduction to Computing	
3) Controls and Robot Applications Area		
ABEN 358	Electric Energy Application in Agriculture	
CSCI 485	Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems	
ECE 461	Control Systems I	
ECE 463	Modern Control	
IME 482	Automated Manufacturing Systems	
ME 475	Automatic Controls	
4) Measurements and Actuation Systems Area		
ABEN 479	Fluid Power Systems Design	
ABEN 482	Instrumentation & Measurements	
CE 782	Introduction to Intelligent Infrastructure *	
ECE 483	Instrumentation for Engineers	
ME 412	Engineering Measurements	
ME 476	Mechatronics	

Part Two - Approved Additional Courses: Nine (9) credits from the following:**9****Artificial Intelligence & Machine Learning:**

CE 494	Individual Study
CSCI 345	Topics on Personal Computers
CSCI 426	Introduction to Artificial Intelligence
CSCI 436	Intelligent Agents
CSCI 485	
CSCI 488	Human-Computer Interaction
IME 774	Neural Networks *

Perception & Data Processing

ABEN 482	Instrumentation & Measurements
ECE 444	Applied Digital Signal Processing
ECE 448	Image Analysis I
ECE 483	Instrumentation for Engineers
ME 412	Engineering Measurements

Electric Machines and Control Systems

ECE 376	Embedded Systems
ECE 461	Control Systems I
ECE 463	Modern Control
ECE 476	Advanced Embedded Systems
ME 475	Automatic Controls
ME 476	Mechatronics

Kinematics & Dynamics of Machineries

ABEN 478	Machinery Analysis & Design
ABEN 479	Fluid Power Systems Design
ME 442	Machine Design I
ME 489	Vehicle Dynamics
ECE 761	Advanced Control Theory I *

Applications of Unmanned Systems

ABEN 358	Electric Energy Application in Agriculture
ABEN 452	Bioenvironmental Systems Design
IME 437	Methods for Precision Manufacturing
IME 482	Automated Manufacturing Systems
PAG 115	Introduction to Precision Agriculture
PAG 315	Electronic Systems in Precision Ag
PAG 454	Applications of Precision Agriculture
CE 425	Bridge Evaluation and Rehabilitation
CE 452	Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance
CE 782	Introduction to Intelligent Infrastructure *
IME 782	Robotics/CAD/CAM/Control Systems *
IME 784	Computer Integrated Manufacturing *

Total Credits**18**

* Graduate level courses will require the student to obtain a class permit from the department teaching the class before enrolling.

Program Notes

- Any course used to satisfy Part One: Core Courses may not use that course to satisfy any of the nine credits for Part Two: Approved Courses.

Social Science Education**Department Information**

- Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center

- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/social-science-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/social-science-education/>)

Social science involves the study of people and their interactions with each other, with their social and political institutions and with their environments. Accordingly, the social science education major includes a broad range of courses and subjects. Teacher candidates are expected to demonstrate both breadth and depth of understanding in the academic disciplines that make up the social sciences.

The Program

Candidates in the social science education major are prepared to teach a diverse curriculum to a diverse student population. The social science education teacher candidate should work closely with an advisor to be sure that the general education courses taken will provide a strong foundation for the advanced courses in the major.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the School of Education (SOE). Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators exam or meet minimum scores on the ACT+. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced social science teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

An academic advisor works individually with social science education majors to plan their programs of study and to advise and assist them as they progress to degree completion. Students are encouraged to seek their advisor's help whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentsuccess/>

LICENSURE

Upon completing this program, teacher candidates are eligible for teacher licensure in social science in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

There has been a surplus of social science teachers across the country for the past several years. It has been predicted that the surplus will continue. Students who elect to major in social science education should consider obtaining a second major or a teachable minor to enhance their employment prospects. In addition, students in social science education are encouraged to seek volunteer and employment experiences that complement their education. Summer or after-school work with special needs students, high school or middle school student activities, or other human service activities can provide the candidate valuable experience with children and adolescents.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 110		3 ENGL 120	3
ENGL 110		3 GEOL 106	3
HIST 101		3 GEOL 106L	1
Science & Technology		3 HIST 102	3

Social & Behavioral Sciences	3	Quantitative Reasoning	3
Wellness	2-3	HIST Diversity & Inclusion in History	3
17-18			16
Second Year			
Fall	Credits	Spring	Credits
EDUC 321		3 EDUC 322	3
HIST 103		3 HIST 104	3
GEOG/ECON/POLS Elective		3 GEOG/ECON/POLS Elective	3
HIST European History		3 HIST Widening Horizons	3
Science & Technology		3 HIST European History	3
Complete Core Academic Skills Exam or access your ACT+ scores		Apply to the School of Education	
15			15
Third Year			
Fall	Credits	Spring	Credits
EDUC 451		3 EDUC 489	3
GEOG/ECON/POLS Elective		3 GEOG/ECON/POLS Elective	3
ECON 201, POLS 115, or GEOG 151		3 GEOG/ECON/POLS Elective	3
HIST Widening Horizons		3 HIST US 300-400 Elective	3
HIST US 300-400 Elective		3 Science and Technology	3-4
15			15-16
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 481 (Social Sciences)		3 EDUC 485	1
EDUC 486		3 EDUC 487	9
HIST 390		3 EDUC 488	3
GEOG/ECON/POLS Elective		3	
GEOG/ECON/POLS Elective		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
15			13

Total Credits: 121-123

Social Science Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**
www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/social-science-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/social-science-education/#planofstudytext>)

Major Requirements

Major: Social Science Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Teaching Specialty Requirements		
HIST 101	Western Civilization I (May satisfy general education category A)	3
HIST 102	Western Civilization II (May satisfy general education category A)	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST 390	Historical Research and Writing (May satisfy general education category C)	3
HIST: Non-US History (300-400 level)		6
HIST: US History (300-400 level)		6

Select two of the following areas (A-C):**24****A. Political Science (12 cr):**

POLS 115	American Government
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Select 3 from the following:

POLS 215	Problems and Policies In American Government
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POLS 230	Judicial Process
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POLS 420	Political Behavior-Executive-Legislative Process
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POLS 421	Political Behavior-Political Parties
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POLS 422	State and Local Politics
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POLS 430	Constitutional Law-Civil Liberties
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POLS 431	Constitutional Law-Criminal Justice
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B. Geography (12 cr):

GEOG 262	Geography of North America
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GEOL 106	The Earth Through Time
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GEOG	Geography Electives (6 cr)
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C. Economics (12 cr):

ECON 201	Principles of Microeconomics
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ECON 202	Principles of Macroeconomics
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ECON:Electives (6 cr)	
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US HIST (6 credits)* Select from:**6**

HIST 328	War and Society in America
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HIST 415	Public Memory and Memorialization in America
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HIST 420	Colonial American History
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HIST 421	Revolutionary America
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HIST 422	American Civil War and Reconstruction
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HIST 423	The Gilded Age and Progressive America
----------	--

HIST 424	U.S. History 1917-1960
----------	------------------------

HIST 425	U.S. History 1917-Present II
----------	------------------------------

HIST 426	Women in American History
----------	---------------------------

HIST 431	The North American Plains
----------	---------------------------

HIST 434	Environmental History
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HIST 436	American Frontier to 1850
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HIST 437	American West Since 1850
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RELS 340	New Religious Movements
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RELS 345	Religion and Politics
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European HIST* (6 credits) select from:**6**

HIST 320	History of Christianity
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HIST 450	Ancient History
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HIST 451	Medieval History
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HIST 454	Renaissance And Reformation
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HIST 455	The Eighteenth Century
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HIST 456	Europe 1815-1914
----------	------------------

HIST 457	Europe Since 1914
----------	-------------------

HIST 464	Imperial Spain
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HIST 465	Germany since 1750
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HIST 467	History Of Russia II
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Widening Horizons* (6 credits) Select from:**6**

HIST 381	Australia & New Zealand
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HIST 440	The Ottoman Empire
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HIST 470	Modern Latin America I
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HIST 471	Modern Latin America II
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HIST 473	Colonial Mexico
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HIST 474	Modern Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
Diversity and Inclusion in HIST* (3 credits) select from:		3
HIST 135	Race in U.S. History	
HIST 271	Introduction to Latin American History	
HIST 280	History of East Asia to 1600	
HIST 281	History of East Asia from 1600	
HIST 320	History of Christianity	
HIST 355	History of Global Islam	
HIST 415	Public Memory and Memorialization in America	
HIST 426	Women in American History	
HIST 440	The Ottoman Empire	
HIST 473	Colonial Mexico	
HIST 475	The Aztec, Maya, and Inca	
HIST 477	Slavery in the Atlantic World	
HIST 480	History of Modern China from 1600	
HIST 481	History of Japan	
HIST 482	Vietnam: 125 Years of Conflict	
HIST 484	Cultures and Civilizations of the Pre-modern World	
HIST 485	Cultural Exchange and the Making of the Modern World	
HIST 486	Plague! Tragedies and Triumphs of Globalization	
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Soc Sci)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		103

* None of these courses can be double counted with another HIST requirement

Degree Requirements and Notes

- A GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Social Work & Human Development and Family Science

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/undergraduate_studies/prospective_majors/social_work/ (http://www.ndsu.edu/hdfs/undergraduate_studies/prospective_majors/social_work/)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/social-work-human-development-family-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/social-work-human-development-family-science/>)

The dual-degree program in human development and family science and social work offers students an integrated knowledge of children, adolescents, adults and families across the life span that will prepare them for careers in the helping professions. Students will gain a broad range of knowledge and skills that will equip them to address the needs and aspirations of people living in a changing world and be eligible for North Dakota licensure as social workers.

The Program

Students are concurrently enrolled in the family science or adult development and aging option of human development and family science (HDFS) at North Dakota State University and the social work major through Minot State University (MiSU). The culmination of these requirements leads to a Bachelor of Science from NDSU as well as a Bachelor of Social Work from MiSU.

Under a cooperative agreement, students remain on the NDSU campus to complete all course work for the dual degree. The courses specific to the social work major are offered on the NDSU campus by MiSU faculty or offered through interactive video.

Together the HDFS degree and the social work degree complement and strengthen the knowledge and skills that students will possess upon completion of this dual degree program. The curriculum combines course work in human development and family science with course work in social work. The curriculum includes a strong liberal arts base, studies in human development, family science, social work practice, social welfare, human behavior and research, and additional course work in economics, psychology, sociology and political science.

Selective Admission

Admission to the dual degree program consists of two separate university applications:

1. Application for admission to NDSU for the human development and family science/social work dual degree prior to beginning the program,
2. After admission and enrollment at NDSU and after meeting with an advisor, application for admission to Minot State University, and
3. Upon completion of specific requirements, application for admission to MiSU social work program.

Field Education

Students are required to complete 465 hours of direct practice with either a public or private human service agency. This supervised field practice enables students to gain valuable hands-on experience working with clients.

The social work program does not give academic credit for life experience or work experience, nor does the program allow such experience to be substituted for field education.

Financial Aid and Scholarships

The Office of Financial Aid and Scholarships at NDSU makes available grants, loans, scholarships and work-study employment. Scholarships also are available through the College of Human Sciences and Education. For more information visit:

<https://www.ndsu.edu/onestop/finaid/scholarships/>

The Facilities

Facilities for the dual degree program are housed in Evelyn Morrow Lebedeff Hall and the Family Life Center.

Extra-Curricular Opportunities

Students may enhance their involvement by participating in groups such as the HDFS Club and/or the Student Social Work Organization.

Community Setting

The Fargo-Moorhead metropolitan area offers a setting conducive to study. Students have the opportunity to work in a number of community institutions serving children and families.

Accrediting Agency

The social work program is accredited by:

The Council on Social Work Education

1701 Duke Street, Suite 200

Alexandria, VA 22314-3457

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
HDFS 242		3 ENGL 120	3
PSYC 111		3 POLS 115 or 215	3
MATH 104		3 SOC 110	3
Science & Technology Gen Ed		3 HDFS 230	3
		15	15
Sophomore			
Fall	Credits	Spring	Credits
BIOL 126, 111, 150, or 220		3 PHIL 215, 101, or 210	3
BIOL 100L, 150L, or 220L		1 ECON 105, 201, or 202	3
HDFS 250		3 HDFS option course (Family or Aging)**	3
PSYC 212		3 CSCI 114 or TL 116	3
SWK 250: Interpersonal Skills		3 SWK 330: Human Behavior & Soc Env	3
SWK 256: Development of Social Welfare		3 SWK 335: Methods I - Individuals	3
		16	18
Junior			
Fall	Credits	Spring	Credits
HDFS 275		3 STAT 330	3
PSYC 270		3 HDFS option course (Family or Aging)**	3
HDFS 300-400 level elective		3 HDFS Any Level Elective	3
Humanities/Fine Arts Gen Ed		3 HDFS 390 Career Development	1
SWK 331: Family Dynamics		3 SWK 426: Methods II - Groups	3
SWK 430 or HMS 279		3 SWK 402, 428, or HMS 279	3
		18	16

Senior			
Fall	Credits	Spring	Credits
HDFS Option Course (Family or Aging)**		3 HDFS 496***	1
HDFS 353		3 SWK 490 Field Education	12
ENGL 320, 325, 358, or 459		3 SWK 491 Senior Seminar	3
Additional Cultural Diverse Gen Ed		3	
SWK 427: Methods III - Organizations		3	
			15
			16
Total Credits: 129			

* In accordance with North Dakota University System Policy 402.1.2 and Procedure 402.1.2, ACT or SAT Mathematics sub-test scores, as well as COMPASS Mathematics scores and the NDSU Math Placement Test are used to determine placement of students into entry-level Mathematics courses.

** Adult Development & Aging option courses are HDFS 360, 480, 482; Family Science option courses are HDFS 341, 357, 462

*** Students should NOT enroll themselves in HDFS 496 via Campus Connection. The NDSU Registration and Records office automatically enrolls students in the course during the student's teaching semester.

Social Work & Human Development and Family Science Dual Degree Program with Minot State University

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/ (<http://www.ndsu.edu/hdfs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/social-work-human-development-family-science/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/social-work-human-development-family-science/#planofstudytext>)

Major Requirements

Major at NDSU: Human Development & Family Science

Major at Minot State University: Social Work

Degree Type: B.A. or B.S.

Minimum Degree Credit to Graduate: 127

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{††}		
Global Perspectives (G) ^{††}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Human Development & Family Science Core Requirements		
Select one of the following: (May satisfy general education category S) ¹		4
BIOL 111 & BIOL 100L	Concepts of Biology and Non-Majors Biology Lab	
BIOL 126 & BIOL 100L	Human Biology and Non-Majors Biology Lab	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	
Select one of the following:		3
PHIL 101	Introduction to Philosophy (May satisfy general education category A)	
PHIL 210	Ethics	
PHIL 215	Contemporary Moral Issues (May satisfy general education category A)	
Select one of the following: (May satisfy the general education category B and G) ¹		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
Select one of the following: (May satisfy general education category C)		3
ENGL 320	Business and Professional Writing	
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3
HDFS 230	Life Span Development (May satisfy general education category B)	3
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	3

HDFS 250	Introduction to Research Methods in Human Development and Family Sciences ²	3
HDFS 275	Diversity and Multiculturalism in Individual and Family Life (May satisfy general education category B and D) ²	3
HDFS 353	Children, Families and Public Policy ²	3
HDFS 390	Career Development	1
HDFS Elective	(HDFS 196 and HDFS 496 may not be used)	3
HDFS 300/400	300/400 Level Elective (HDFS 496 may not be used)	3
POLS 115	American Government ¹	3
or POLS 215	Problems and Policies In American Government	
PSYC 111	Introduction to Psychology (May satisfy general education category B) ¹	3
PSYC 212	Psychological Aspects of Drug Use and Abuse (May satisfy general education category B) ²	3
PSYC 270	Abnormal Psychology (May satisfy general education category B) ²	3
SOC 110	Introduction to Sociology (May satisfy general education category B) ¹	3
STAT 330	Introductory Statistics (May satisfy general education category R) ²	3
Cultural Diversity	Elective-Select one additional cultural diversity course from the NDSU general education cultural diversity list	3
SWK 250	Interpersonal Skills ¹	3
SWK 256	Development of Social Welfare ¹	3
SWK 330	Human Behavior and the Social Environment	3
SWK 331	Family Dynamics	3
SWK 335	Social Work Methods I	3
SWK 426	Social Work Methods II	3
SWK 427	Social Work Methods III	3
SWK 490 & 491	Field Education & Senior Seminar (to be taken in the same semester) & HDFS 496: Field Experience (1 cr.)	16
SWK 430	Diversity, Oppression, and Social Change OR SWK 402: Native American Children and Adolescents	3
SWK Elective	Elective	3
Select either the Family Science or Adult Development & Aging option listed below		9
Total Credits		111

Family Science Option

Code	Title	Credits
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
Total Credits		9

Adult Development and Aging Option

Code	Title	Credits
HDFS 360	Adult Development and Aging	3
HDFS 480	Community Resources of Later Life	3
HDFS 482	Family Dynamics of Aging	3
Total Credits		9

¹ Prerequisite for admission to the Social Work program includes: ENGL 110, ENGL 120, COMM 110, BIOL 111, 126, 150, or 220, ECON 105, 201 or 202, POLS 115 or 215, PSYC 111, SOC 110, SWK 250, and SWK 256.

² No substitutions allowed.

Degree Requirements and Notes

- A grade of C or better is required for all HDFS and SWK prefix courses, regardless of whether they are used for the major core, major electives, general education, or free electives.
- A 2.50 cumulative GPA is required in major courses for graduation.

- Course taken *Pass/Fail* cannot be used to satisfy any requirements other than total credits.

Sociology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Email:**
ndsu.soc.anth@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/sociology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/sociology/>)

Sociology is the study of human social interaction and social organizations. Sociologists study social change, diverse communities and their interactions, and use scientific methods to find empirical answers to complex social questions. Studying sociology fosters creativity, innovation, critical thinking, analytic problem solving, and communication skills. Sociology majors are employed in a variety of business, nonprofit, and government jobs.

The Program

Sociologists attempt to develop a better understanding of the way society works. They examine social relationships in institutions like the family, religion, the economy, health care, media, education and government. Sociology majors develop applied research and analytical skills and a perspective that prepares them to address social concerns. Courses are offered on campus and online. North Dakota State University offers graduate work leading to a master's degree and frequently has students who pursue doctorates at other universities.

Faculty and Facilities

The faculty in the department provides expertise in specialties such as community, gerontology, gender issues, medical sociology, religion, research methods, social psychology, assessment and tribal studies. The department contains two social research laboratories.

Preparation

A basic background in the social sciences is important for a career in sociology. Students are encouraged to plan a curriculum that gives them a broad general education.

Career Opportunities

Sociological expertise can be useful in careers that involve community service, urban and regional planning, industrial development, population analysis, agricultural and rural life advocacy, economic or marketing studies, health-related work, government administration, human relations, human and social services, management or personnel, and research analysis.

Internship Program

Students in sociology may apply for the internship program. Students typically complete internships during their junior or senior year. Internship opportunities exist in many agencies in North Dakota and Minnesota and can be done any time during the calendar year. Students who complete internships are able to combine the theoretical and applied aspects of professional preparation. Our students have worked in a variety of settings including human and social services, volunteer agencies, community development, business and industry.

The Curriculum

Sociology students explore their interests within the program, including community development, gerontology, medical sociology, applied sociology, environmental sociology and gender issues, by taking classes in the areas of their choice.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ANTH 111 or 206		3 COMM 110	3
SOC 110, 115, or 116		3 ENGL 120	3
ENGL 110		3 Humanities/Fine Arts	3
Science/Technology		3 MATH 104	3
Wellness		2	
		14	12
Second Year			
Fall	Credits	Spring	Credits
SOC 214		3 SOC 410	3
AHSS Requirement		3 Science/Technology with lab	4
Science/Technology		3 Language/Minor	3
Language/Minor		3 Humanities/Fine Arts	3
		Sociology Electives	
		12	13
Third Year			
Fall	Credits	Spring	Credits
SOC 340		3 SOC 422	3
SOC 470		3 Sociology electives	6
Upper Level Writing		3 Language or minor	3
Language or Minor		3 Internship or additional course	3
Sociology Elective		3	
Global Perspective		3	
		18	15
Fourth Year			
Fall	Credits	Spring	Credits
SOC 489		1 Electives @ 300-400 level	6
Electives @ 300-400 level		9 AHSS requirement	3
Electives or minor		8 Elective or minor	9
		18	18

Total Credits: 120

Sociology

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Email:**
ndsu.soc.anth@ndsu.edu
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/sociology/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/sociology/#planofstudytext>)

Major Requirements

Major: Sociology

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Sociology Core Requirements		
ANTH 111 or ANTH 206	Introduction to Anthropology (May satisfy general education category B and D) *	3
SOC 110 or SOC 115 or SOC 116	Introduction to Sociology (May satisfy general education category B) * Social Problems Global Social Problems	3
SOC 214	Social Interaction *	3
SOC 340	Social Research Methods *	3
SOC 410	Social Inequality *	3
SOC 422	Development Of Social Theory *	3
SOC 470	Social Data Analysis *	3
SOC 489	Senior Capstone In Sociology *	1
Electives: Select an additional 12 credits from the electives listed below:		12
SOC 233	Sociology of Organizations and Work	
SOC 235	Cultural Diversity	
SOC 401	Sociology of Religion	
SOC 405	Community Development	
SOC 407	Deviant Behavior	
SOC 412	Sociology of Gender	
SOC 416	Sociology Through Literature	
SOC 417	Sociology of the Family	
SOC 418	Social Psychology	
SOC 424	Feminist Theory and Discourse	
SOC 425	Sociology of Culture	
SOC 426	Sociology of Medicine	
SOC 431	Environmental Sociology	
SOC 439	Social Change	
SOC 440	Sociology of Aging	
SOC 441	Death and Dying	
Total Credits		34

* A grade of 'C' or better is required in all of the Core Requirements for the major.

Minor Requirements

Minor: Sociology

Required Credits: 18

Code	Title	Credits
Core Courses		
ANTH 111 or ANTH 206	Introduction to Anthropology Introduction to Cultural Anthropology: Peoples of the World	3
SOC 110 or SOC 115 or SOC 116	Introduction to Sociology Social Problems Global Social Problems	3
Required Courses: Select two of the following:		6
SOC 214	Social Interaction	
SOC 233	Sociology of Organizations and Work	
SOC 340	Social Research Methods	
SOC 410	Social Inequality	
SOC 422	Development Of Social Theory	
SOC 470	Social Data Analysis (This course is going through approvals and should be officially listed soon.)	
Minor Electives: Select any two SOC prefix courses at the 300-400 level		6
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Emergency Management majors who wish to complete this minor must complete 9 unique sociology credits (i.e. courses that were not completed for the major of EM).

Soil Science

Department Information

- **Department Location:**
Scholl of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/ (<http://www.ndsu.edu/snrs/degrees/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/soil-science/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/soil-science/>)

Soil Science is the study of the soil as a component of natural and man-made systems and is the key factor in food production and is at the forefront of environmental and natural resource issues such as land use, soil contamination, ground water quality and waste disposal. Offered as a minor program of study only.

Soil Science

Department Information

- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
701-231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/ (<http://www.ndsu.edu/snrs/degrees/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/soil-science/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/soil-science/>)

Minor Requirements

Minor: Soil Science

Required Credits: 18

Code	Title	Credits
Required Courses		
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
SOIL 444	Soil Genesis and Survey	3
Elective Courses		
Select three of the following:		9
SOIL 264	Natural Resource Management Systems	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Ecohydrology and Physics	
SOIL 447	Microclimatology	
SOIL/NRM/RNG 454	Wetland Resources Management	
SOIL 465	Soil And Plant Analysis	
Total Credits		18

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- Students must earn a minimum 2.00 GPA for the minor requirements.

Spanish

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/spanish/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/spanish/#planofstudytext>)

Major Requirements

Major: Spanish

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

A minimum grade of 'B' is required for all SPAN prefix courses counted for the Spanish major.

Code	Title	Credits
Spanish Major Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Advanced Language:		
SPAN 401 or SPAN 402	Advanced Spanish Grammar and Writing (May satisfy a general education category C) Advanced Spanish Conversation	3
Civilization:		
SPAN 330 or SPAN 331	Introduction to Spanish Civilization Introduction to Spanish American Civilization	3
Spanish American Literature:		
Select one of the following:		3
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
Peninsular Literature:		
Select one of the following:		3
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 452	Cervantes	
SPAN 453	Spanish Women Writers	
Foreign Language:		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both semesters..		8
Additional Courses:		
Select from the following and any course not used above:		9
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
Study Abroad and Capstone Experience:		
SPAN 492	Study Abroad (Requires a minimum of one semester-14 weeks at the 300+ level in a program pre-approved by the Modern Languages Dept.)	1-15
SPAN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Total Credits		37-51

Degree Notes:

- Of the 28 credits required for the Spanish major, 15 must be NDSU resident credits in addition to the capstone (i.e. cannot be taken Tri-College or study abroad). Note: Other University-wide residency requirements will apply.

Minor Requirements

Minor: Spanish

Required Credits:18

A minimum grade of 'B' is required for all courses used for the Spanish minor.

Code	Title	Credits
Minor Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330 or SPAN 331	Introduction to Spanish Civilization Introduction to Spanish American Civilization	3
SPAN 401 or SPAN 402	Advanced Spanish Grammar and Writing Advanced Spanish Conversation	3
Select one course form the following:		3

SPAN 332	Introduction to Hispanic Cinema
SPAN 430	Approaches to Literature
SPAN 440	Traditions in Spanish American Literature
SPAN 441	Contemporary Spanish American Literature
SPAN 442	Introduction to Chicano Literature
SPAN 443	Spanish American Women Writers
SPAN 450	Traditions in Spanish Literature
SPAN 451	Contemporary Spanish Literature
SPAN 452	Cervantes
SPAN 453	Spanish Women Writers

Additional Electives - Select from any course listed on this guide not previously taken. **3**

Total Credits **18**

Minor Requirements and Notes

- A minimum of 9 credits must be taken at NDSU; cannot be taken through Tri-College or study abroad.

Spanish

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/spanish/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/spanish/>)

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include health care, public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

Students wishing to prepare for high school teaching should make this intention known to the School of Education and to the Department of Modern Languages to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
SPAN 201 or 311		3 SPAN 202 or 312	3
ENGL 110		3 ENGL 120	3
Gen Ed Quantitative Reasoning		3 COMM 110	3
Gen Ed Social and Behavioral Sciences		3 Gen Ed Science/Tech	3
Gen Ed Wellness		2 AHSS College Requirement	3
		14	15
Second Year			
Fall	Credits	Spring	Credits
SPAN 330 or 331 (Civilization)		3 SPAN 401 or 402 (Advanced Language)	3
One year of a Second Language Course		3-4 One year of a Second Language Course	3-4
AHSS College Requirement		3 AHSS College Requirement	3
Gen Ed Science/Tech		3 Gen Ed Social and Behavioral Sciences	3
Minor Course or Elective		3 Minor or Elective Course	3
		15-16	15-16
Third Year			
Fall	Credits	Spring	Credits
SPAN 450, 451, 452, or 453 (Peninsular Literature)		3 SPAN 492 ([14+ weeks] Upper-division Courses Approved by Advisor)	1-15
Additional SPAN Course		3	
Gen Ed Upper-Division Writing		3	
Gen Ed Science/Tech with Lab		4	
Minor Course or Elective		3	
		16	14
Fourth Year			
Fall	Credits	Spring	Credits
SPAN 440, 441, 442, or 443 (Spanish American Literature)		3 SPAN 489 (Senior Thesis)*	1
Additional SPAN Course		3 Additional SPAN Course	3
Minor Courses or Electives		9 Minor Courses or Electives	12
		15	16
Total Credits: 120-122			

* SPAN 489: Senior Thesis must be completed after the study abroad experience.

Spanish Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**

www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)

- **Credential Offered:**

B.S.; B.A.

- **Official Program Curriculum:**

bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-education/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-education/>)

Spanish Education involves learning about Spanish language and culture, while simultaneously developing knowledge and skills related to teaching. Your classes will be a blend of content courses related to the language, as well as teaching courses.

The Program

Candidates in the Spanish education major are prepared for a language teaching career by getting the best of both worlds: content courses with faculty in the Department of Modern Languages and professional education courses from faculty in the School of Education (SOE). In addition to required courses, Spanish education teacher candidates need to study abroad where the target language is spoken. A degree in Spanish education will prepare teacher candidates to teach Spanish at the 5-12 level.

Professional Education Courses

Teacher candidates may enroll in the 300-level professional education courses before being formally admitted to the SOE. Prior to enrolling in the 400-level courses, teacher candidates must complete the application for admission to the SOE; attain a minimum of a 2.75 grade point average overall in their course work and education courses; and pass the Praxis Core Academic Skills for Educators test or meet minimum scores on the ACT+. A minimum grade of "B" is required in the SPAN teaching specialty courses. Requirements for admission can be found on the School of Education website (<https://www.ndsu.edu/education/>).

Student Teaching

Student teaching (clinical practice) is the culmination of the teaching program. During In the clinical practice, teacher candidates apply the knowledge and skills acquired in their college courses to real-world classrooms under the supervision of experienced Spanish teachers in middle or high schools. Faculty members from NDSU conduct regular on-site visits to support, encourage, and evaluate teacher candidates so that they gain the confidence and ability to join the teaching profession after graduation.

Student Advisement

Students will be assigned individual advisors who will work closely in program planning and in other ways to advise and assist them. Students are encouraged to seek advising from both Modern Languages and the School of Education whenever needed. Appointments with advisors can be scheduled through the Navigate online system found on the Student Affairs web page, <https://www.ndsu.edu/enrollmentmanagement/studentssuccess/>

Licensure

Upon completing this program, teacher candidates are eligible for certification to teach Spanish in most states. Upon completing this program, teacher candidates are eligible for teacher licensure in certification to teach Spanish in most states. Our program is accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education Standards and Practices Board (ESPB).

Career Opportunities

The demand for language teachers continues to be great. In general, "employment of high school teachers is projected to grow 8 percent from 2016-2026, about as fast as the average for all occupations. Rising student enrollment should increase demand for high school teachers, but employment growth will vary by region" (<https://www.bls.gov/ooh/education-training-and-library/high-school-teachers.htm>)

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ENGL 110		3 COMM 110	3
SPAN 201		3 EDUC 321	3
Wellness Gen Ed		2 ENGL 120	3
Social & Behavioral Science Gen Ed		3 SPAN 202	3
Quantitative Reasoning Gen Ed		3 Science & Technology Gen Ed	3

Complete Core Academic Skills Exam or access your ACT+ scores			
		14	15
Second Year			
Fall	Credits	Spring	Credits
EDUC 322		3 EDUC 451	3
SPAN 311		3 SPAN 312	3
Other Foreign Language I		4 SPAN 401	3
Science & Technology Gen Ed		3 Spanish Special Methods Course (completed through Tri-College at MSUM or Concordia)	3
Elective		3 Other Foreign Language II	4
Apply to the School of Education			
		16	16
Third Year			
Fall	Credits	Spring	Credits
EDUC 481		2-3 Semester Abroad (5 upper division Spanish courses approved by advisor)	15
EDUC 489		3	
SPAN 330 or 331 or SPAN Elective		3	
SPAN Elective		3	
Science & Technology with lab Gen Ed		4	
		15-16	15
Fourth Year			
Fall	Credits	Spring	Credits
EDUC 486		3 EDUC 485	1
SPAN 489		1 EDUC 487	9
Social & Behavioral Science Gen Ed		3 EDUC 488	3
SPAN Elective		3	
SPAN Elective		3	
Elective		3	
Apply for Student Teaching			
Complete PLT (grades 7-12) Exam			
Complete Subject Area Assessment Exam			
		16	13

Total Credits: 120-121

Spanish Education

Department Information

- **Department Location:**
Katherine Kilbourne Burgum Family Life, 4-H Center
- **Department Phone:**
701-231-7921
- **Department Web Site:**

www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)

• **Credential Offered:**

B.S.; B.A.

• **Plan Of Study Sample:**

bulletin.ndsu.edu/programs-study/undergraduate/spanish-education/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/spanish-education/#planofstudytext>)

Major Requirements

Major: Spanish Education

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

- GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.
- A minimum grade of 'B' is required in the SPAN teaching specialty courses.

Code	Title	Credits
Teaching Specialty Requirements		
SPAN 311	Spanish Conversation and Composition I	3

SPAN 312	Spanish Conversation and Composition II	3
Civilization:		
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing (May satisfy general education category C)	3
or SPAN 402	Advanced Spanish Conversation	
Spanish American Literature: Select one of the following:		3
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	
SPAN 442	Introduction to Chicano Literature	
SPAN 443	Spanish American Women Writers	
Peninsular Literature: Select one of the following:		3
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	
SPAN 452	Cervantes	
SPAN 453	Spanish Women Writers	
Electives : Choose from the following or any other courses not used above:		9
SPAN 332	Introduction to Hispanic Cinema	
SPAN 430	Approaches to Literature	
Study Abroad & Capstone Experience:		
SPAN 492	Study Abroad (minimum 1 semester=14 weeks-at 300+ level in a program pre-approved by Modern Languages Dept.)	1-15
SPAN 489	Senior Thesis (Consult dept./advisor semester before enrolling)	1
Foreign Language:		
A minimum of one year of a second foreign language is required, with grades of 'C' or better in both courses.		8
Professional Education Requirements		
EDUC 321	Introduction to Teaching	3
EDUC 322	Educational Psychology	3
EDUC 451	Instructional Planning, Methods and Assessment	3
EDUC 481	Classroom Practice Methods of Teaching I: (Lang)	3
EDUC 485	Student Teaching Seminar	1
EDUC 486	Classroom Management for Diverse Learners	3
EDUC 487	Student Teaching	9
EDUC 488	Applied Student Teaching	3
EDUC 489	Teaching Students of Diverse Backgrounds	3
Total Credits		68-82

Degree Requirements and Notes

- A grade of 'C' or better is required in all Professional Education Requirement courses.
- A GPA of 2.75 or better in professional education as well as passing the appropriate Praxis II exam are required to exit the program.
- Of the 28 required credits of Spanish, a minimum of 15, in addition to the capstone, must be resident credit (i.e. taken at NDSU, cannot be Tri-College nor study abroad).
- Courses taken *Pass/Fail* will not be used to satisfy any requirement other than total credits for graduation.
- See School of Education (<https://www.ndsu.edu/education/>) for admission requirements.

Spanish Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887

- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/spanish-studies/>)

Broader in scope than the traditional minor which emphasizes linguistic competence, the Spanish Studies minor combines systematic language study with courses in geography, history, civilization, and politics to enhance students' understanding of the global context of the language they have chosen to study. A languages studies minor requires 18 approved semester credits, including nine credits of language and civilization study beyond the intermediate level (SPAN 311, SPAN 312 and a civilization course in the language), a six-credit sequence in history, and an approved three-credit elective in Anthropology, Geography, or Political Science; study abroad is strongly encouraged.

Spanish Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7887
- **Department Email:**
ndsu.modernlanguages@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)
- **Credential Offered:**
Minor
- **Program Overview:**
<https://bulletin.ndsu.edu/programs-study/undergraduate/spanish-studies/>

Minor Requirements

Minor: Spanish Studies

Required Credits: 18

Code	Title	Credits
Spanish Studies Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
SPAN 330 or SPAN 331 may be completed through study abroad.		
History Electives		
Must be a sequence. Or a history sequence appropriate to student's area of study.		
HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3
Additional Electives: Select one of the following:		3
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 151	Human Geography	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
SPAN 492	Study Abroad	
Total Credits		18

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Sport Management

Department Information

- **Department Location:**
Bentson Bunker Fieldhouse
- **Department Phone:**
701-231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/undergraduate_programs/sport_management/ (http://www.ndsu.edu/hnes/undergraduate_programs/sport_management/)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/sport-management/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/sport-management/>)

The sport management (SM) major is a four-year full-time program of study that is designed to prepare students to excel in the sport industry. SM students are guided through coursework and hands-on experiences within the sport industry that allow each student to focus on the ever-changing intricacies of the sport environment from multiple contexts. Within the curriculum, students are encouraged to explore the area(s) of sport they are most interested in, ranging anywhere from local non-profits to national and international professional franchises.

The Program

The SM degree is designed to prepare students for employment in local, state, regional, national or international level sporting and recreation organizations. The curriculum covers 50 credit hours in total and includes a Minor in Business Administration (24 credits) to enhance the employment prospect for each student.

Career Opportunities

NDSU SM graduates are employed in a variety of sport and recreation occupations. Graduates should expect to work in local, state, regional, national or international level organizations, business, and nonprofits. Since the inception of the eSports lab in the Student (Memorial) Union on campus, we have worked closely to ensure students with an interest with eSports are able to explore the industry with professionally-outfitted equipment and through educational opportunities.

In light of the interdisciplinary nature of our program study options, career opportunities beyond the sport management or recreation management fields are feasible.

Sport Management Association

The Sport Management Association (SMA) provides students with an opportunity to build relationships with peers and industry leaders in sport and recreation. Organization members can take part in sports-oriented community projects, learn about different sport and recreation careers from area professionals and become further prepared for a career in the industry. The SMA holds meetings regularly, with dues-paying members eligible for the many planned activities, adventures, and feasts scheduled by the association.

Pre-Professional Standing and Professional Standing

The pre-professional SM courses in the freshman and sophomore years are designed to prepare students for additional undergraduate work in the subsequent professional SM courses during their junior and senior years.

To achieve professional standing a student must:

- Have reached 50 credits in total,
- Have completed all HNES courses listed in the pre-professional years,
- Have a grade of B or better in HNES 190 and HNES 226,

-Successfully complete ECON 105 and ACCT 102 with a collective GPA of 2.5 or higher across both classes. A student CANNOT receive a D in either course,

-Earn a minimum cumulative GPA of 2.75 for all classes by the end of the sophomore year (reaching 50 credits minimum).

An application for professional standing will be accepted by the SM Program Coordinator as soon as requirements are met at the end of each academic semester. It is highly recommended all students review the student handbook and all communications from the SM Program Coordinator prior to applying for the program. If a student is accepted into the program, they will be required to meet with the Program Coordinator to review and sign that they have read the student handbook.

Internship

The SM internship is the capstone course for all SM majors. Students participating in an internship will complete 12 credits, with each credit requiring 43 hours of documented work at an internship site (totaling 516 hours of on-the-job experience). The internship can be repeated at various sites/organizations at their advisor's discretion. Securing a host organization outside North Dakota or the United States is not only possible but encouraged.

Students have completed internship hours in several areas across sport, including but not limited to: Air Force Academy Athletics, Arizona State University Athletics, Bismarck Larks, Fargo and West Fargo Parks and recreation departments, Fargo-Moorhead RedHawks, Fargo Youth Hockey, Great Rides Fargo, Iowa Cubs, Minnesota Twins, Minnesota Vikings, NDSU Athletics, Oklahoma State University Athletics, Saint Paul Saints, Scheels Arena, Southern Texas PGA, US Olympic Committee, Washington Spirit, and the YMCA of Cass & Clay Counties.

Sequencing Courses for the Major

Courses in the SM major are laid out to ensure students are heavily involved with sport-related materials during their years as a professional standing student. Our students are also educated on the general aspects of the business world as they complete their Minor in Business Administration. After all, sport is a business!

HNES 190 is our Introductory course that provides students with a detailed overview of the sport industry and provides students an opportunity to better understand what is expected of professionals in sport and recreation management. Future classes provide students a more detailed view of the many imperative elements that are part of the successful sport managers' toolkit. The degree is capped with the student obtaining 516 hours of on-the-job experience working alongside experts and influencers within the sport industry.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (Gen Ed Communication)		3 COMM 110 (Gen Ed Communication)	3
HNES 190 ¹		3 COMM 112 (Gen Ed Social & Behavioral Sci)	3
Gen Ed Quantitative Reasoning		3 ENGL 120 (Gen Ed Communication)	3
Gen Ed Wellness		2 Gen Ed Humanities/Fine Arts	3
Gen Ed Social & Behavioral Science		3 Gen Ed Science & Technology	3
		14	15
Sophomore			
Fall	Credits	Spring	Credits
ACCT 102 (Busn Minor)		3 ECON 105 (Busn Minor & Gen Ed Global Perspective)	3
COMM 200		3 HNES 226	3
Gen Ed Humanities/Fine Arts & Cult Div		3 HNES 274	3
Gen Ed Science & Technology		3 Gen Ed Science & Tech w/ Lab	4
Elective		3 Elective	3
		15	16

Junior			
Fall	Credits	Spring	Credits
ENGL 320 (Gen Ed Communication)		3 HNES 324	3
HNES 304		3 HNES 431	3
HNES 485 ²		3 HNES 485 ²	3
MGMT 320 (Busn Minor)		3 Business Competency or Elective	3
MRKT 320 (Busn Minor)		3 Business Competency or Elective	3
		15	15
Senior			
Fall	Credits	Spring	Credits
HNES 425		3 HNES 436	3
HNES 426		3 HNES 485 ²	3
HNES 485 ²		3 Business Minor	3
Business Minor		3 Business Minor	3
Business Minor		3 Business Competency or Elective	3
		15	15

Total Credits: 120

¹ Require a grade of B or better

² **HNES 485 Internship** can be taken for variable credit (depending on hours) throughout various terms, including summer, to reach a total 12 credits.

Sport Management

Department Information

- **Department Location:**
Bentson/Bunker Field House
- **Department Phone:**
701-231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/undergraduate_programs/sport_management/ (http://www.ndsu.edu/hnes/undergraduate_programs/sport_management/)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/sport-management/#planofstudytext (<http://bulletin.ndsu.edu/programs-study/undergraduate/sport-management/#planofstudytext>)

Major Requirements

Major: Sport Management

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.

- a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

- A cumulative GPA of 2.75 or higher is required for admission to the Sport Management program.
- An NDSU GPA of 2.75 or higher must be maintained and the student must earn a grade of "C" or better in the HNES major requirements courses to retain status in the professional program.

Code	Title	Credits
Sport Management Core Requirements		
COMM 112	Understanding Media and Social Change (May satisfy general education category B)	3
COMM 200	Introduction to Media Writing	3
HNES 190	Introduction to Sport Management *	3
HNES 224	Sport and Event Management **	3
HNES 226	Socio-Cultural Dimension in Sport **	3
HNES 274	Introduction to Youth and Interscholastic Sport **	3
HNES 304	Sport Promotion and Public Relations **	3
HNES 425	Practical Sport Marketing Research **	3
HNES 426	Sport Administration **	3
HNES 431	Governance, Policy, Legal Liability and Ethics in Sport **	3
HNES 436	Managing Sport Facilities **	3
HNES 485	Sport Management Internship (students need to have completed HNES 190, 324, 226 and 304 to be eligible for HNES 485) **	12
Required Minor - Business Administration		24

Minor application form is required to be completed with the College of Business. The business minor requires a 2.50 GPA in minor courses which cannot be taken pass/fail.

Select one of the following options	9
Option 1 - Management Group (Student must choose 9 credits) - MGMT 330, MGMT 430, MGMT 450, MGMT 451, MGMT 453, MGMT 454, MGMT 470, or BUSN 340	

Option 2 - Marketing Group (Student must choose 9 credits) - MRKT 362, MRKT 410, MRKT 420, MRKT 460, MRKT 470, or BUSN 340

Option 3 - Electives - student may take 9 credits of elective courses

Total Credits

78

* Requires a grade of 'B' or better.

** Requires a grade of C or higher

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.
- Students who have specific career goals in mind may elect to complete additional minor(s) by choosing focused electives. Examples of other minors that compliment Sport Management include: Accounting, Community Development, Hospitality & Tourism Management, Human Development and Family Science, Journalism, Public Relations & Advertising, and Management Communication.

Statistics

Department Information

- **Department Location:**
Morrill Hall 221
- **Department Phone:**
701-231-7532
- **Department Email:**
ndsu.stats@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/statistics/ (<http://www.ndsu.edu/statistics/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/statistics/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/statistics/>)

Today, most professional statistical training is received at the undergraduate, as well as at the graduate level. A major in statistics and a minor in any of the other related areas, such as mathematics, computer science, agriculture, biological sciences or social sciences provide a good blend of training suitable for many jobs in industry, government and academic institutions. It is becoming increasingly important for those in other disciplines to have good familiarity with basic statistical techniques and inference procedures.

The Program

The Department of Statistics offers a major leading to bachelor's, master's and doctoral degrees. Two undergraduate minors are offered, one in applied statistics and the second in statistics. Graduate certificates in Statistics and Big Data Applied Statistical Analysis are also available. A mathematics and statistics double major, the pre-actuarial science option and a degree in behavioral statistics are offered at the undergraduate level.

The department provides opportunities to study both applied and theoretical aspects of statistics. Computers are extensively used in statistics instruction, and statistical software packages and programs are utilized in various courses. Data analysis is an important aspect in applied statistics courses.

Career Opportunities

There are excellent opportunities in statistics. Major corporations and most government agencies continually look for talented individuals with this type of education. Since even greater job opportunities are open to those with advanced statistical training, many undergraduates proceed directly to graduate work in statistics. Many students combine statistics with areas such as business, education, economics or biology.

Career opportunities are varied. A statistician may:

- consult in the design and analysis of clinical studies, evaluating new pharmaceutical agents;
- design experiments for agricultural, ecological, environmental or energy-related studies;
- determine mortality, morbidity and accident rates for an insurance company;
- serve as an opinion pollster for a public relations firm or a television network;
- develop theories of learning and behavior in conjunction with psychologists;
- determine optimal combinations and evaluate performance of various chemicals in industrial setups;

- conduct reliability and quality control studies in various industries; or
- develop econometrics, time series and forecasting models for determining the cause and effects of various socio-economic variables on society.

Statisticians work closely with other scientists and researchers to develop new statistical techniques, adapt existing techniques, design experiments and direct analyses of surveys and retrospective studies.

Statisticians are ranked number one in best STEM jobs in 2017 according to U.S. News and World Report.

The Facilities

The campus has several computer clusters connected to the campus network and the Internet. SAS, SPSS, Minitab, JMP, and R are among the statistical packages available. Computer consultants are available to assist students if programming help is needed.

Statistics Curriculum

For a statistics major, 15 to 18 credits in mathematics, four to seven credits in computer science and 21 to 27 credits in statistics are required. A minor in one of the following areas is also required: social science, physical science, biological sciences, business, mathematics or computer science.

Students interested in biostatistics may minor in biological sciences.

A student interested in business statistics may minor in business administration.

Pre-Actuarial Option

A joint degree with mathematics with a pre-actuarial science option is also available.

Behavioral Statistics Requirements

The behavioral statistics degree is a joint effort between the Department of Statistics and the Department of Psychology. Students wishing to obtain a degree in behavioral statistics should consult with an advisor in both departments. Employment opportunities include working with medical or Medicare data. Graduates of this program are expected to have good quantitative reasoning skills and strong people skills.

The Faculty

- Rhonda C. Magel, Ph.D., Professor, Chair, University of Missouri, 1982; Field: Nonparametrics, Inference Under Order Restrictions, Regression
- Megan Orr, Ph.D., Associate Professor, Iowa State University, 2012; Field: Gene Expression Analysis, High-Dimensional Data Analysis, Multiple Testing
- Gang Shen, Ph.D., Associate Professor, Purdue University, 2009; Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem
- Ronald Degges, Ph.D., Associate Professor of Practice, North Dakota State University, 2011; Field: Survival Analysis, Nonparametrics and Regression
- Bong-Jin Choi, Ph.D., Assistant Professor, University of South Florida, 2014; Field: Computational Statistics, Machine Learning, Biostatistics, Public Health Research
- Mingao Yuan, Ph.D., Assistant Professor, Purdue University, 2018; Field: Network Analysis, Big Data Analysis, Statistical Machine Learning
- Andrew Lexvold, M.S., Lecturer, North Dakota State University, 2016; Field: Biostatistics, Bayesian and Spatial Analyses Applied to Election Forecasting

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110		3 ENGL 120	3
COMM 110		3 MATH 129	3
MATH 165		4 MATH 166	4
STAT 330		3 CSCI 114	3
Wellness Gen Ed		2 Social & Behavioral Sciences Gen Ed (Global Perspectives or Cultural Diversity)	3

Sophomore			
Fall	Credits	Spring	Credits
STAT 367		3 STAT 368	3
STAT 461		3 CSCI 160	4
MATH 265		4 Minor Requirement	3
Humanities & Fine Arts Gen Ed (Global Perspectives or Cultural Diversity)		3 Humanities and Fine Arts Gen Ed	3
Science and Tech Gen Ed w/Lab		4 Science and Technology Gen Ed	3
		17	16
Junior			
Fall	Credits	Spring	Credits
Statistics Elective		6 STAT Elective	3
Minor Requirement		3 Minor Requirement	3
Social and Behavioral Sciences Gen Ed		3 Upper Division Writing Gen Ed	3
CSCI 222 or MATH 270		3 Humanities/Social Sciences Gen Ed	3
		15	12
Senior			
Fall	Credits	Spring	Credits
STAT Elective		3 STAT 462	3
Minor Requirement		3 STAT Elective	3
Humanities/Social Sciences Gen Ed		3 Minor Requirement	4
Electives		6 Electives	4-6
		15	14

Total Credits: 120

Statistics

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-7532
- **Department Email:**
ndsu.stats@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/academics/programs/ (<http://www.ndsu.edu/academics/programs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/statistics/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/statistics/>)

Major Requirements

Major: Statistics

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in ALL courses used toward the major.

Code	Title	Credits
Statistics Major Requirements		
CSCI 160	Computer Science I	4
CSCI 222	Discrete Mathematics	3
or MATH 270	Introduction to Abstract Mathematics	
MATH 129	Basic Linear Algebra	3
MATH 165	Calculus I (May satisfy general education category R)	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design (Capstone)	3
Electives: Select 15 credits from the following (can choose only one CSCI course):		15
CSCI 161	Computer Science II	
CSCI 418	Simulation Models	

MATH 329	Intermediate Linear Algebra
STAT 460	Applied Survey Sampling
STAT 463	Nonparametric Statistics
STAT 464	Discrete Data Analysis
STAT 467	Probability and Mathematical Statistics I
STAT 468	Probability and Mathematical Statistics II
STAT 469	Introduction to Biostatistics
STAT 470	Statistical SAS Programming
STAT 471	Introduction to the R Language
STAT 472	Time Series

Minor Requirement **16**

A minor is required in one of the following disciplines: Social Science, Physical Science, Biological Science, Business, Mathematics, or Computer Science.

Total Credits **65**

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Minor: Statistics

Standard Track

Required Credits: 22

Code	Title	Credits
Required Courses		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
STAT 331	Regression Analysis	2
or STAT 461	Applied Regression Models	
STAT 367	Probability	3
STAT 368	Statistics	3
STAT 462	Introduction to Experimental Design	3
STAT Elective	400 Level	3
Total Credits		22

Applied Statistics Track

Required Credits: 17

Code	Title	Credits
Required Courses		
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2
STAT Electives	Select 4 department approved 400-level, 3 credit statistics courses.	12
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Strategic Communication

Department Information

- **Department Location:**
Minard Hall

- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/strategic-communication/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/strategic-communication/>)

Major Requirements

Major: Strategic Communication

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
Pre-Communication Requirements:		
Students must complete the following 18 credits of coursework with a minimum GPA of 3.00 to be admitted to the professional major.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 220	Persuasion	3
Professional Strategic Communication Major		
COMM 101	Majors and Careers in Communication	1
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3
COMM 377	Media Planning	3
COMM 425	Specialty Writing	3
COMM 431	Communication Ethics and Law	3
COMM 470	Research for Strategic Communication	3
COMM 472	Public Relations Campaigns	3
or COMM 473	Case Study in Public Relations	
or COMM 476	Advertising Campaign Practicum	
COMM 496	Field Experience	3
Select one of the following for upper division writing requirement:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 322	Writing and the Creative Process	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 326	Writing in the Design Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
Electives:		18

Six COMM courses selected in consultation with one's advisor. Students can specialize in Advertising or Public Relations. Up to 3 additional credits of COMM 496 can be counted toward this requirement.

Total Credits

64

Program Note: Student enrollment is limited to one degree program offered by the Department of Communication.

Minor Requirements

Minor: Strategic Communication

Required Credits: 21

Code	Title	Credits
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3
Professional Specialization Electives:		12
COMM 308	Business and Professional Speaking	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Media	
COMM 376	Advertising Creative Strategies	
COMM 377	Media Planning	
COMM 425	Specialty Writing	
COMM 435	Critical Approaches to Popular Culture	
COMM 442	Digital Media and Society	
COMM 465	Convergence Media	
COMM 472	Public Relations Campaigns	
COMM 476	Advertising Campaign Practicum	
COMM 485	Risk and Crisis Communication	
Total Credits		21

Minor Requirements and Notes

- Student enrollment is limited to one degree program offered by the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Strategic Communication

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/strategic-communication/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/strategic-communication/>)

Strategic Communication is one of four majors offered by the Department of Communication. Students may choose from professional emphases in advertising or public relations.

Why Choose a Major in the Department of Communication?

Our students pursue degrees in Communication because they are interested in fast-paced careers where every day brings something new. They want to make a difference in the world while doing something they love – whether that's reporting breaking news, designing advertisements, running social media campaigns, promoting organizations, or leading others in the workplace.

As a Strategic Communication major, you will get:

- **More time to explore your interests.** We give you the first year to explore your options, making it possible to switch between **four different COMM majors** without extending your graduation timeline.
- **Guidance on choosing a career.** In COMM 101: Majors and Careers in Communication, you will meet others in your major, learn more about possible careers, and find campus resources that help you achieve your professional goals.
- **Hands-on learning.** You'll have multiple ways to apply what you are learning through course projects, consulting for local organizations, and participating in national competitions.
- **Built-in communities.** You can connect with other students - while building your resume - through the **eight student organizations** affiliated with our department.
- **Professional experience.** We help you find and benefit from internships in your field through our relationships with local and regional employers.

Strategic Communication Major

A public relations emphasis will orient students to the principles and practices of public relations, an advertising emphasis to the principles and practices of advertising. Students will complete an applied capstone course in their final semester. Students majoring in strategic communication may earn a Bachelor of Science degree (includes an approved minor) or a Bachelor of Arts degree (includes a modern language proficiency).

Admission to the Major

Students complete 18 credits of Pre-Communication courses with a minimum 3.00 GPA to be admitted to the professional program in strategic communication. These courses include COMM 110, COMM 112, COMM 114, COMM 212, COMM 220, and ENGL 120.

Internship Requirement

Internships offer practical experience for strategic communication students. Three credits (120 hours) of field experience are required for the major, and many students complete more than one internship. Students have interned with advertising/marketing firms, non-profits, and media companies in the Fargo-Moorhead area and beyond. Internships often lead to jobs.

Career Opportunities

Coursework in the strategic communication major prepares students for careers that include graphic design, copy writing/editing, client services, event planning, promotion, evaluation, publicity and media relations, creative design, professional business consulting, and corporate training. The courses in each emphasis area promote written and oral communication skills and prepare students to communicate in meaningful and effective ways with a variety of audiences.

Extra-Curricular Activities

Students majoring in strategic communication are encouraged to gain experience by joining the Advertising Club or the department's chapter of the Public Relations Student Society of America (PRSSA). NDSU has two honoraries for top students majoring in a degree program offered by the Department of Communication. Pi Kappa Delta is a national honor fraternity for students involved in human communication activities. Lambda Pi Eta is a national honorary for communication majors with high academic achievement.

High School Preparation

A well-rounded high school education with experiences in high school music, forensics, theater, journalism, FFA, or scouting serves as good preparation for the strategic communication major. Students with interests in science and art, business and service, and publicity and promotion will find a major in this department to be a good fit.

Scholarships

The Department of Communication awards a number of scholarships to students who excel in academics and who have demonstrated career potential. Applications are due by March 1. Visit **the department website** for details.

The Faculty

Faculty members in the Department of Communication are dedicated teachers, scholars, and practitioners who are committed to providing high-quality courses, hands-on learning experiences, and opportunities for undergraduate research. We encourage students who want to learn more about strategic communication to reach out via email or schedule an appointment via **Navigate**.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 101		1 COMM 110	3
COMM 112		3 COMM 200	3
COMM 114		3 ENGL 120	3
ENGL 110 (or placement)		3 Humanities/Arts GE	3
Quantitative Reasoning GE		3 Science/Technology GE	3
Wellness GE		2 Science/Technology Lab GE	1
		15	16
Second Year			
Fall	Credits	Spring	Credits
COMM 212		3 COMM 375	3
COMM 220		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Global Perspectives GE		3 Humanities/Arts GE	3
Science/Technology GE		3 Science/Technology GE	3
		15	15
Third Year			
Fall	Credits	Spring	Credits
COMM 377		3 COMM 425	3
Major Elective		3 COMM 496	3
Minor or Language Coursework		3 Major Elective	3
AHSS Requirement		3 Minor or Language Coursework	3
Upper Division Writing		3 AHSS Requirement	3
		15	15
Fourth Year			
Fall	Credits	Spring	Credits
COMM 431		3 COMM 472, 473, or 476	3
COMM 470		3 Major Elective	3
Major Elective		3 Major Elective	3
Minor or Language Coursework		3 Minor or Language Coursework	3
Additional Coursework or Internship		3 Additional Coursework May Be Required to Reach 120 Credits	1
		15	13

Total Credits: 119

Theatre Arts

Department Information

- **Department Location:**
Reineke Fine Arts Center 115
- **Department Phone:**

701-231-7932

- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/theatre/ (<http://www.ndsu.edu/performingarts/theatre/>)
- **Credential Offered:**
B.A.; B.S.; B.F.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/theatre-arts/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/theatre-arts/>)

The Department of Theatre Arts is dedicated to the highest standards of excellence in both its academic and performance/technical theatre programs. Its energies are committed to fostering student creativity in all areas of theatre—design, performance, directing and management—and to help students gain better insights into themselves and the world around them. The theatre arts program has been a vital and important part of the curriculum and student activities at North Dakota State University for more than 100 years. The program is accredited by the National Association of Schools of Theatre.

The Curriculum

The department offers three undergraduate degree programs in theatre. Each is flexible and can be designed to fit the individual student's career goals.

The Bachelor of Arts (B.A.) in theatre arts is a general baccalaureate degree built around a traditional liberal arts curriculum. Courses are required in technical theatre, performing and directing, as well as in literature, theatre history and modern language. The B.A. program requires proficiency of a foreign language at the second year level.

The Bachelor of Science (B.S.) degree is an alternative to the B.A. The B.S. requires a minor in an approved field.

The Bachelor of Fine Arts (B.F.A.) with an emphasis in musical theatre, performance or design technology is a professionally-oriented degree track that places primary emphasis on performance and studio activity, while also requiring a high level of involvement in the academic curriculum. It can be entered only by audition. This degree track broadens the student's exposure to his or her field, and considerable study is made of other fine arts fields as well.

Admission to the B.F.A. degree program in theatre requires consistent involvement in Theatre NDSU and LCT Productions, and demands a high level of commitment on the part of the student.

The Program

Theatre NDSU is a laboratory for learning in which imaginative play and disciplined work are fused in dramatic creations. A high degree of professionalism is consistently displayed.

(1) *Main Stage Productions*—four plays are produced each school year. These productions range from modern musicals such as *Bloody, Bloody Andrew Jackson* and *Sweeney Todd* to classic comedies such as *The Comedy of Errors* and *Noises Off*, including contemporary and ancient plays of the widest variety. Production seasons are chosen according to a four year style-rotation cycle. This ensures that during the course of his or her undergraduate career, the student will have the opportunity to acquire first-hand knowledge of all major performance styles in the Western theatrical tradition, including Devise work and TYA or Theatre for Young Audiences.

(2) *The Newfangled Theatre Company* is the student branch of Theatre NDSU. This student-managed company produces up to four shows in the second stage season.

Numerous dramatic activities take place on a flexible schedule in Studio Theatre Productions. There are showcase productions for B.F.A. candidates and for student acting or directing projects as well as a dance recital each semester.

The Facilities

Theatre arts students study, work and create on three stages:

- (1) Askanase Auditorium (the main stage), a 380-seat theatre with continental seating,
- (2) the Studio Theatre, a flexible studio-lab black box space also located in Askanase Hall, and
- (3) the 1,000-seat Festival Concert Hall, in Reineke Fine Arts Center, used for major musical stage productions.

In addition, Askanase Hall contains theatre classrooms, costume, scene and property shops.

Career Opportunities

Theatre training develops and exercises the creative imagination. Our graduates have found a rich variety of professions. Former students have gone on to earn advanced degrees in theatre and related fields and now teach in colleges and universities, community colleges and high schools. Other graduates of our program work in arts management, technical theatre and technical consulting, as well as in community theatre, semi-professional repertory companies, professional theatre and commercial radio and television. Theatre NDSU is committed to helping students understand the value of entrepreneurship in the Arts, creating their own work and community outreach.

Scholarships

A number of scholarships in theatre arts are available for students both in performance and technical emphases. Several scholarships are available to incoming freshmen. Both a student's academic record and his or her level of achievement in the production program are criteria used in awarding these scholarships. Active participation in the NDSU theatre arts program is expected of all scholarship recipients. Applications can be found on the Department of Theatre Arts website (<https://www.ndsu.edu/performingarts/theatre/scholarships/>).

Sample Program Guide

B.F.A. Design & Tech

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

Freshman			
Fall	Credits	Spring	Credits
THEA 150		1 THEA 210	1
THEA 180		3 THEA 220 or 221	1
THEA 210		1 THEA 270 or 271	3
THEA 270 or 271		3 THEA 373	3
THEA 220 or 221		1 THEA 272	3
THEA 230 or 279		3 ENGL 120	3
ENGL 110		3 Quantitative Reasoning Gen Ed	3
		15	17
Sophomore			
Fall	Credits	Spring	Credits
THEA 161		3 THEA 210 or 211	2
THEA 210 or 211		2 THEA 280	3
THEA 371 or 375		3 THEA 370	3
THEA 230 or 279		3 THEA 376 or 377	3
THEA 275 (or science gen ed)		3 Science & Technology Gen Ed w/lab	4
		14	15
Junior			
Fall	Credits	Spring	Credits
THEA 210 or 211		2 THEA 210 or 211	2
THEA 275 (or science gen ed)		3 THEA 376 or 377	3
THEA 370		3 THEA 486 or 487	3
THEA 371 or 375		3 ENGL 380	3
COMM 110		3 Upper Level Writing Gen Ed	3
Social & Behavioral Science Gen Ed		3	
		17	14
Senior			
Fall	Credits	Spring	Credits
THEA 365		3 THEA 210 or 211	2

THEA 450	3	THEA 486 or 487	3
THEA 480	3	ART 111	3
MUSC 100 or 111	3	Social & Behavioral Science/Cultural Diversity Gen Ed	3
Science & Technology Gen Ed	3	Wellness Gen Ed	2
15		13	

Total Credits: 120

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.F.A. Musical Theatre

Freshman			
Fall	Credits	Spring	Credits
THEA 161		3 THEA 266	3
THEA 150		1 THEA 210	1
THEA 180		3 THEA 263	1
THEA 210		2 THEA 270 or 271	3
MUSC 167		1 THEA 220 or 221	1
MUSC 130		3 ENGL 120	3
MUSC 132		1 MUSC 160	1
ENGL 110		3 MUSC 167	1
		Quantitative Reasoning Gen Ed	3
17		17	

Sophomore			
Fall	Credits	Spring	Credits
THEA 210		1 THEA 210, 223, or 224	2
THEA 362		2 THEA Design Elective taken fall or spring	
THEA 364		3 THEA 228 or 368	3
THEA 270 or 271		3 THEA 263	1
THEA 220 or 221		1 THEA 280	3
MUSC 267		1 COMM 110	3
THEA Design Elective taken fall or spring		3 MUSC 267	1
THEA 367 (Or Gen Ed)		3 Social & Behavioral Science Gen Ed	3
17		16	

Junior			
Fall	Credits	Spring	Credits
THEA 210		2 THEA 210	2
THEA 362		2 THEA 228 or 368	3
THEA 365		3 THEA 466 or 368	3
THEA 467 (course offered every other fall)		3 MUSC 367	1
THEA 275 (or science gen ed)		3 THEA 263	1

MUSC 367	1	Science & Technology Gen Ed wlab	4
THEA 367 or 463	3	Wellness Gen Ed	2
17			16
Senior			
Fall	Credits	Spring	Credits
THEA 450	3	THEA 210	2
THEA 467 if not taken Junior year		ART 111	3
THEA 463 if not taken Junior year		THEA 466 or 368	3
THEA 480	3	Social & Behavioral Science/Global Perspectives Gen Ed	3
MUSC 100 or 111	3	Science & Technology Gen Ed	3
MUSC 467	1		
THEA 275 (or science gen ed)	3		
Upper Level Writing Gen Ed	3		
16			14

Total Credits: 130

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.F.A. Performance

Freshman			
Fall	Credits	Spring	Credits
THEA 161	3	THEA 210	1
THEA 210	1	THEA 270 or 271	3
THEA 150	1	THEA 220 or 221	1
THEA 270 or 271	3	THEA 266	3
THEA 220 or 221	1	THEA 262	1
ENGL 110	3	ENGL 120	3
THEA 180	3	Social and Behavioral Science/Global Perspectives Gen Ed	3
15			15
Sophomore			
Fall	Credits	Spring	Credits
THEA 210	2	THEA 210	2
THEA 275 (Or Gen Ed)	3	THEA 280	3
THEA 364	3	THEA 361 or 466	3
MUSC 100 or 111	3	THEA Design Elective taken fall or spring	3
THEA Design Elective taken fall or spring		COMM 110	3
Science & Technology w/Lab Gen Ed	4	Quantitative Reasoning Requirement	3
15			17

Junior			
Fall	Credits	Spring	Credits
THEA 210		2 THEA 210	2
THEA 365		3 Performance Elective: 160/228/345	3
Performance Elective: 160/228/345		3 THEA 361 or 466	3
THEA 462 or 467		3 THEA 263	1
MUSC 162 or 167		1 THEA 461 or 368	3
Social & Behavioral Science Gen Ed or THEA 275		3 ENGL 380	3
15			15
Senior			
Fall	Credits	Spring	Credits
THEA 450		3 THEA 210	2
THEA 480		3 THEA 263	1
THEA 462 or 467		3 THEA 461 or 368	3
Upper level Writing		3 ART 111	3
Science & Technology Gen Ed		3 Science & Technology Gen Ed	3
		Wellness Gen Ed	2
15			14

Total Credits: 121

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

B.A./B.S.

Freshman			
Fall	Credits	Spring	Credits
THEA 161		3 THEA 270 or 271	3
THEA 150		1 THEA 220 or 221	1
THEA 180		3 ENGL 120	3
THEA 270 or 271		3 COMM 110	3
THEA 220 or 221		1 THEA 210	1
ENGL 110		3 Quantitative Reasoning Requirement	3
THEA 210		1	
15			14
Sophomore			
Fall	Credits	Spring	Credits
THEA 210		2 THEA 210	2
Theatre Elective		6 THEA Design Elective ^{take fall or spring}	3
THEA Design Elective ^{Take Fall or Spring}		Theatre Elective	6
Humanities and fine Arts Requirement		3 Minor Requirement for BS ^(Foreign Language for BA)	3

Minor Requirement for BS ^(Foreign Language for BA)		3	Science & Technology Requirement	3
		14		17
Junior				
Fall	Credits	Spring	Credits	
THEA 210		2	THEA 210	2
THEA 365		3	THEA 280	3
Humanities and fine Arts Requirement		3	Theatre Elective	6
Social & Behavioral Science Gen Ed		3	Minor Requirement for BS ^(AHSS Elective for BA)	3
Science & Technology Gen Ed w/lab		4	Science & Technology Gen Ed	3
		15		17
Senior				
Fall	Credits	Spring	Credits	
THEA 450		3	THEA 210	2
THEA 480		3	Theatre Elective	3
Upper level Writing		3	Social & Behavioral Science Gen Ed	3
Minor Requirement for BS		6	Minor Requirement for BS	3
			Wellness Gen Ed	2
		15		13
Total Credits: 120				

Theatre Arts

Department Information

- **Department Location:**
Reineke Fine Arts Center
- **Department Phone:**
701-231-7932
- **Department Email:**
ndsu.performing.arts@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/performingarts/theatre/ (<http://www.ndsu.edu/performingarts/theatre/>)
- **Credential Offered:**
B.A.; B.S.; B.F.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/theatre-arts/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/theatre-arts/>)

Major Requirements

Major: Theatre Arts

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.

6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Students must earn a grade of 'C' or better in all THEA prefix courses.

Code	Title	Credits
Core Requirements		
THEA 150	Theatre Foundations I	1
THEA 161	Acting I	3
THEA 180	Dramatic Literature and Style I	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab	4
THEA 280	World Theatre	3
THEA 365	Directing I	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
Design/Technology Requirement		
Select one from the following: ¹		3
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
Practicum - 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable, 1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits repeatable)	
Electives: Select 21 credits from the following courses. Minimum of 9 credits must be 300 level or above:		21
THEA 115	World Film	
THEA 160	Storytelling	
THEA 228	Development of Musical Theatre	
THEA 262	Introduction to Dance	
THEA 266	Voice and Movement for the Actor	
THEA 275	Theatrical Makeup Design	
THEA 279	Scenic Painting	
THEA 345	Devising	
THEA 361	Acting III: Advanced Realism	
THEA 362	Dance Styles for Theatre	
THEA 364	Advanced Acting	
THEA 367	Acting the Song	
THEA 370	Technical Theatre Production	
THEA 371	Introduction to Design: Scenic Design ¹	
THEA 373	Lighting and Sound Design for the Theatre ¹	
THEA 375	Costume Design for the Theatre ¹	
THEA 377	Theatrical Design Studio II: Collaboration of the Designer	
THEA 379	Study Tour Abroad	
THEA 461	Acting Shakespeare	
THEA 465	Directing II	
THEA 485	Directing III	
ENGL 380	Shakespeare	
Total Credits		63

¹ Can use a different pair toward the 15 credits of elective.

Major Requirements

Major: Theatre Arts - Design & Tech Theatre Track

Degree Type: B.F.A.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Code	Title	Credits
Professional Major Requirements		
Students must earn a minimum grade of a 'C' in all THEA prefix courses.		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
MUSC 100	Music Appreciation (May satisfy general education category A)	3
or MUSC 103	Introduction to Music History	
THEA 161	Acting I	3
THEA 150	Theatre Foundations I	1
THEA 230	Introduction to Theatrical Rendering	3
THEA 180	Dramatic Literature and Style I	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab *	4

THEA 271 & THEA 221	Costume Craft and Costume Craft Lab *	4
THEA 272	Drawing for the Theatre *	3
THEA 275	Theatrical Makeup Design *	3
THEA 279	Scenic Painting *	3
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 365	Directing I	3
THEA 370	Technical Theatre Production (Take 3 credits 2 times) *	6
THEA 371	Introduction to Design: Scenic Design	3
THEA 373	Lighting and Sound Design for the Theatre	3
THEA 375	Costume Design for the Theatre	3
THEA 376	Theatrical Design Studio I: Theatrical Drawing and Rendering *	3
THEA 377	Theatrical Design Studio II: Collaboration of the Designer *	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 486	History of Dress and Decor I; the Foundations of Western Style *	3
THEA 487	History of Dress and Decor II; Western Style since 1800 *	3
Practicum- 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable, 1-2 credits) *	
THEA 211	Stage Management Practicum and Seminar (2 credits) *	
Related Area:		
ENGL 380	Shakespeare	3
Total Credits		87

* Students must earn a minimum grade of a 'B' in these Design and Technology courses.

Major Requirements

Major: Theatre Arts - Musical Theatre Track

Degree Type: B.F.A.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10

Humanities and Fine Arts (A) [†]	6
Social and Behavioral Sciences (B) [†]	6
Wellness (W) [†]	2
Cultural Diversity (D) ^{**†}	
Global Perspectives (G) ^{**†}	
Total Credits	39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA or MUSC prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
MUSC 100 or MUSC 103	Music Appreciation (May satisfy general education category A) Introduction to Music History	3
MUSC 130	Theory and Analysis I	3
MUSC 132	Ear Training & Sight Singing I	1
MUSC 160	Piano Class I ((Possible to test out of this requirement))	1
MUSC 167	Applied Voice (2 credits in different semesters)	2
MUSC 267	Applied Voice (2 credits in different semesters)	2
MUSC 367	Applied Voice (2 credits in different semesters)	2
MUSC 467	Applied Voice	1
THEA 150	Theatre Foundations I	1
THEA 161	Acting I ¹	3
THEA 180	Dramatic Literature and Style I	3
THEA 228	Development of Musical Theatre ¹	3
THEA 263	Dance Studio (take one each of Jazz, Lyrical Ballet, Tap) ¹	3
THEA 364	Advanced Acting	3
THEA 266	Voice and Movement for the Actor ¹	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab (Taken with THEA 270 Stagecraft)	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab (Taken with THEA 271 Costume Craft)	4
THEA 275	Theatrical Makeup Design	3
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 362	Dance Styles for Theatre (Take 2 times) ¹	4
THEA 365	Directing I	3
THEA 368	Business of Acting	3
THEA 367	Acting the Song	3
THEA 450	Capstone Experience	3
THEA 463 ACTING THE SONG II		3
THEA 466	Advanced Voice for the Actor ¹	3
THEA 467	Advanced Movement for the Actor ¹	3
THEA 469 MUSICAL THEATRE AUDIT		3
THEA 480	History and Literature of Theatre I	3
Select one from the following:		3
THEA 371	Introduction to Design: Scenic Design	

THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
Theatre Practice - 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable 1-2 credits) ²	
THEA 211	Stage Management Practicum and Seminar (Repeatable - 2 credits)	
Total Credits		97

¹ Students must earn a minimum grade of 'B' in these music, dance and performance courses.

² First year students taking THEA 220 or THEA 221 will not take Practicum 210. When students take THEA 222, 223 or 224 they will take Practicum 210 for 1 cr.

Major Requirements

Major: Theatre Arts - Performance Track

Degree Type: B.F.A.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA prefix courses.

Code	Title	Credits
Professional Major Requirements		
ART 111	Introduction to Art History (May satisfy general education category A and G)	3
ENGL 380	Shakespeare	3
MUSC 100 or MUSC 103	Music Appreciation (May satisfy general education category A) Introduction to Music History	3
THEA 150	Theatre Foundations I	1
THEA 161	Acting I *	3
MUSC 162 or MUSC 167	Voice Class Applied Voice	1
THEA 180	Dramatic Literature and Style I	3
THEA 261	Advanced Acting	3
THEA 262	Introduction to Dance ¹	1
THEA 263	Dance Studio (take 2 times) ¹	2
THEA 266	Voice and Movement for the Actor ¹	3
THEA 270 & THEA 220	Stagecraft and Stagecraft Lab	4
THEA 271 & THEA 221	Costume Craft and Costume Craft Lab	4
THEA 275	Theatrical Makeup Design	3
THEA 280	World Theatre (May satisfy a general education category D)	3
THEA 361	Acting III: Advanced Realism ¹	3
THEA 365	Directing I	3
THEA 368	Business of Acting ¹	3
THEA 450	Capstone Experience	3
THEA 461	Acting Shakespeare ¹	3
THEA 462	Acting Styles ¹	3
THEA 466	Advanced Voice for the Actor ¹	3
THEA 467	Advanced Movement for the Actor ¹	3
THEA 480	History and Literature of Theatre I	3
Theatre Practice - Repeatable for 12 credits:		12
THEA 210	Theatre Practicum (1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Select two of the following:		6
THEA 160	Storytelling	
THEA 228	Development of Musical Theatre ¹	
THEA 345	Devising	
Select one from the following:		3
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
Total Credits		88

¹ Students must earn a minimum grade of 'B' in these dance and performance courses.

Minor Requirements

Minor: Theatre Arts

Standard Option or

Dance Option

Required Credits: 23

Standard Option

Code	Title	Credits
Theatre Appreciation: Select 2 courses from the following:		6
THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 280	World Theatre	
Theatre Practicum or Labs: Select 2 credits from the following		2
THEA 210	Theatre Practicum	
THEA 211	Stage Management Practicum and Seminar	
THEA 220	Stagecraft Lab	
THEA 221	Costume Craft Lab	
Electives: Select 15 credits from the following:		15
THEA 115	World Film	
THEA 160	Storytelling	
THEA 161	Acting I	
THEA 228	Development of Musical Theatre	
THEA 261	Advanced Acting	
THEA 262	Introduction to Dance	
THEA 263	Dance Studio (repeatable up to 6 cr)	
THEA 266	Voice and Movement for the Actor	
THEA 270	Stagecraft	
THEA 271	Costume Craft	
THEA 275	Theatrical Makeup Design	
THEA 279	Scenic Painting	
THEA 345	Devising	
THEA 362	Dance Styles for Theatre (repeatable up to 3 cr)	
THEA 365	Directing I	
THEA 371	Introduction to Design: Scenic Design	
THEA 373	Lighting and Sound Design for the Theatre	
THEA 375	Costume Design for the Theatre	
THEA 379	Study Tour Abroad	
ENGL 380	Shakespeare	
Total Credits		23

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Dance Option

Required Credits: 23

Code	Title	Credits
Theatre Appreciation: Select 3 courses from the following:		9
THEA 110	Introduction to Theatre Arts	
THEA 161	Acting I	
THEA 180	Dramatic Literature and Style I	
THEA 280	World Theatre	
Theatre Practicum or Labs: Select 2 credits from the following		2
THEA 210	Theatre Practicum	
THEA 211	Stage Management Practicum and Seminar	
THEA 220	Stagecraft Lab	
THEA 221	Costume Craft Lab	
Dance Credits: Take 12 credits in Dance:		12

THEA 262	Introduction to Dance
THEA 263	Dance Studio (Can take up to 6 times)
THEA 362	Dance Styles for Theatre (Can take up to 3 times)

Total Credits**23**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.

Tribal and Indigenous Peoples Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Web Site:**
www.ndsu.edu/ahss/about/tribal_and_indigenous_peoples_studies/ (http://www.ndsu.edu/ahss/about/tribal_and_indigenous_peoples_studies/)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/tribal-indigenous-peoples-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/tribal-indigenous-peoples-studies/>)

North Dakota is the home of the Oceti Sakowin (Dakota, Lakota, and Nakota), Nueta, Sahnish, Hidatsa, and Anishinaabe peoples, in addition to many other diverse Indigenous peoples connected to these lands. There are five federally recognized Tribal Nations including Mandan, Hidatsa, & Arikara Nation (Three Affiliated Tribes), the Spirit Lake (Dakota) Nation, the Standing Rock (Lakota and Dakota) Sioux Tribe, the Turtle Mountain Band of Chippewa (Anishinaabe), and the Sisseton-Wahpeton Oyate (Dakota). Indigenous peoples have lived in North Dakota for over 10,000 years and remain a vibrant force in communities all over the region.

Tribal and Indigenous Peoples Studies builds strong communities through mutual understandings of our shared and complex history, shaped by settler colonialism and white supremacy, that continue to influence our relationships today. The minor is open to all NDSU students who wish to enhance their understanding of the history, culture, and contemporary issues of North American Indigenous populations and Indigenous populations on other continents.

THE PROGRAM

The requirements of the minor are flexible to allow students to create a program most beneficial to them. There is one required introductory course. To complete the other credits required for the 18 credit hour minor, students may choose from offerings in a variety of topics including Education, History, Literature, Anthropology, and Latin American Studies, among others. Students are welcome to transfer credit for courses from Tribal Colleges and other universities for Indigenous languages, or Native American or Indigenous studies courses.

WHAT WILL I LEARN

Students in the minor will be able to:

- describe the diversity of Indigenous history in a global context.
- reflect on Indigenous perspectives and cultural understandings.
- identify ongoing Indigenous issues at the regional, national, and international level, including the concept of and struggles over sovereignty and land rights.
- critically evaluate sources of knowledge about Indigenous peoples and histories.

HOW IT WILL IMPACT MY CAREER

A minor in Tribal and Indigenous Peoples studies will benefit any career choice. Students minoring in TIPS will be better equipped for careers in K-12 education, legal professions, social work, nursing and the health professions, environmental work, and any career that serves a culturally diverse population. TIPS minors will also apply their knowledge to benefiting the communities in which they live.

Minor Requirements:

Introductory Course (3 Credits):

TIPS 101 Introduction to Native American and Indigenous Studies

Electives (15 Credits):

- ANTH 445 Archaeology of Native North America
- ANTH 446 Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity
- ANTH 491 SEMINAR: Community-Based and Indigenous Archaeologies
- ANTH 491 SEMINAR: Indigenous Peoples and Cultures of the Upper-Midwest
- EDUC 489 Teaching Students of Diverse Backgrounds
- ENGL 474 Native American Literature
- HIST 431 The North American Plains
- HIST 436 American Frontier to 1850
- HIST 473 Colonial Mexico
- HIST 475 Aztec, Maya, and Inca
- SPAN 331 Introduction to Spanish American Civilization and Culture

For further information:

Contact the Department of Sociology and Anthropology

Tribal and Indigenous Peoples Studies

Department Information

- **Department Location:**
Minard Hall
- **Department Phone:**
701-231-8657
- **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/tribal-indigenous-peoples-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/tribal-indigenous-peoples-studies/>)

Minor Requirements

Minor: Tribal and Indigenous Peoples Studies

Required Credits: 18

Code	Title	Credits
TIPS 101	Introduction to Native American & Indigenous Studies (Introduction to Native American and Indigenous Studies)	3
Elective Courses - Select 15 credits from the following:		15
ANTH 445	Archaeology of Native North America	
ANTH 446	Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity	
ANTH 458	Indigenous Peoples and Cultures of the Upper Midwest	
ANTH 479	Community-Based and Indigenous Archaeologies (Community Based and Indigenous Archaeologies)	
EDUC 489	Teaching Students of Diverse Backgrounds	
ENGL 474	Native American Literature	
HIST 431	The North American Plains	

HIST 473	Colonial Mexico
HIST 475	The Aztec, Maya, and Inca
HIST 436	American Frontier to 1850
SPAN 331	Introduction to Spanish American Civilization

Total Credits

18

University Studies

Department Information

- **Department Location:**
306 Ceres Hall
- **Department Phone:**
701-231-7111
- **Department Email:**
ndsu.cac@ndsu.edu
- **Department Web Site:**
career-advising.ndsu.edu/ (<http://career-advising.ndsu.edu/>)
- **Credential Offered:**
B.U.S.

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center. The B.U.S degree is designed to provide a unique, nontraditional and interdisciplinary program for students whose goals and objectives cannot be met via a traditionally established academic major or minor. Courses taken include those that fulfill general education requirements, as well as others chosen for their appropriateness in achieving the goals of the individual student.

Degree Plan proposal

Students seeking the Bachelor of University Studies degree usually begin by visiting the Career and Advising Center and talking with an advisor about their long-range goals and aspirations. The advisor will work with the student in preparing the proposal, which includes, a statement of goals, a summary of previous education and experience, and a plan of study for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes a set of requirements for graduation. Each plan of study must meet the general education requirements and the graduation requirements of the university. The Bachelor of University Studies degree does not allow a designated major; instead a student will create an area or areas of emphasis that will help them attain post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least six of those being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study.

The degree plan must be submitted to the B.U.S. Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation). A minimum of 15 credits must be included in the proposal which are completed following approval by the Committee.

Career Opportunities

Employers have expressed enthusiasm for this degree program. It encourages students to think about the future long before graduation and helps them prepare for the kind of life they hope to lead following graduation. Students completing the B.U.S degree may plan careers in a wide variety of fields. Graduates work in health care, government, business, banking, sales, social work, publishing, and the military. Others have used their course work to prepare for further education and have attended medical school, PT school, OT school, law school and seminary, in addition to graduate school. If one can identify a career, one can make plans to achieve that goal.

For further information, contact:

Jessica Bauer
BUS Program Coordinator
Career and Advising Center
306 Ceres Hall

Telephone: 701-231-6313
Email: jessica.m.bauer@ndsu.edu

<https://career-advising.ndsu.edu/b-u-s-degree/>

General Studies Option

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center. The General Studies Option is for adults with prior college credits looking to return to school to finish their bachelor's degree. Students are able to take classes on campus or online, depending on their needs.

The Program

The Bachelor of University Studies: General Studies option allows for a flexible degree path for students looking to return to finish their bachelor's degree. Students must meet all general education requirements (<https://www.ndsu.edu/registrar/academics/gened/>) and graduation requirements (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) as set by NDSU. An Academic Advisor from the Career and Advising Center will work with each student to determine eligibility of the program, remaining requirements, and the best path to degree.

Program Qualifications

Students who would like to pursue the Bachelor of University Studies: General Studies Option, need to be eligible for and enrolled in the NDSU Degree Completion Program. Qualifications for this program are as follows:

- Students who do not hold a prior Bachelor's degree
- Students who have not been enrolled in an institution for a minimum of 2 years (24 consecutive months)
- Students who have earned a minimum of 60 credits
- Students who have a minimum 2.0 Cumulative Grade Point Average

Students who qualify for this program and have not attended NDSU for a minimum of 2 years are eligible to apply for Academic Forgiveness (<https://bulletin.ndsu.edu/past-bulletin-archive/2014-15/undergraduate/academic-policies/scholastic-standards/#forgiveness>).

Advising and Support

All students who are enrolled in the Degree Completion Program and working towards the General Studies Option of the B.U.S degree will be assigned an Academic Advisor and Career Coach from the Career and Advising Center. The Advisor and Career Coach will provide support to the student to make sure all academic and career needs are being met.

For more information, please visit the NDSU Degree Completion Program website: <https://career-advising.ndsu.edu/> (https://career-advising.ndsu.edu/?page_id=29695&preview=true) **degree-completion-program/**

Contact:

Jessie Bauer
Career and Advising Center
306 Ceres Hall

NDSU Dept. 2802, PO Box 6050
North Dakota State University
Fargo, ND 58108-6050
Telephone: 701-231-6313
Jessica.M.Bauer@ndsu.edu

University Studies

Department Information

- **Department Location:**
306 Ceres Hall
- **Department Phone:**
701-231-7111
- **Department Email:**
ndsu.cac@ndsu.edu
- **Department Web Site:**
career-advising.ndsu.edu/ (<http://career-advising.ndsu.edu/>)
- **Credential Offered:**
B.U.S.

Degree Requirements

Degree Type: Bachelor of University Studies (B.U.S)
Minimum Degree Credits to Graduation: 120

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center. The B.U.S degree is designed to provide a unique, nontraditional and interdisciplinary program for students whose goals and objectives cannot be met via a traditionally established academic major or minor. Courses taken include those that fulfill general education requirements, as well as others chosen for their appropriateness in achieving the goals of the individual student.

Degree Plan Proposal

Students seeking the B.U.S. degree will begin by working with an advisor to create the Bachelor of University Studies proposal, which includes a statement of goals, a summary of previous education and experience, and a proposed plan of study (i.e., remaining coursework) for the degree. After both have signed the proposal, it is forwarded to the Bachelor of University Studies Program Review Committee for approval. If the proposal is approved by the committee, it becomes the student's requirements for graduation. Each plan of study must meet the general education requirements (<https://www.ndsu.edu/registrar/academics/gened/>) (including the Capstone Experience, Cultural Diversity and Global Perspectives categories) and the graduation requirements (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/degree-and-graduation/>) of the university. The B.U.S. degree does not allow a designated major, instead a student will create an area or areas of emphasis that will help him or her attain post-graduation goals. Each area of emphasis must include a minimum of 12 credits of study with at least 6 of those credits being upper division credits. In addition to the emphasis area a student may choose to declare an academic minor that they feel will strengthen their plan of study. No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal.

The degree plan proposal must be submitted to the B.U.S Program Review Committee by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation).

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

Code	Title	Credits
Requirements		Credits
Communications (C)		12
Quantitative Reasoning (R)		3
Science & Technology (S) (A laboratory course is included in this requirement.)		10
Humanities & Fine Arts (A)		6
Social & Behavioral Sciences (B)		6
Wellness (W)		2
Capstone		3
Total Credits		42

*Approval of a student's proposal means that the committee believes that the approved plan is the best educational program available to that student and that it is a baccalaureate-level program.

*It is the policy of the College of Arts, Humanities and Social Sciences that students seeking a B.U.S. degree will, following approval of the B.U.S Proposal, be expected to make continual progress toward completion of their degree. Discontinuing enrollment for a period of two continuous academic years or more indicates lack of progress. The approved proposals of students who lack progress will no longer be considered valid for graduation with a B.U.S. degree. If these students choose to continue to seek a B.U.S. degree, it will be necessary to submit a new proposal for consideration by the committee.

*In addition to the Bachelor of University Studies' continual progress policy, NDSU requires that any student who discontinues enrollment for more than one year is subject to completing the General Education requirements in effect at the time of re-entry.

For further information, contact:

Career and Advising Center
306 Ceres Hall
NDSU Dept. 2802, P.O. Box 6050
North Dakota State University
Fargo, ND 58108-6050
Telephone: 701-231-7111
ndsu.cac@ndsu.edu

Degree Requirements

Degree Type: Bachelor of University Studies (B.U.S.)

Sub-Plan: General Studies

Minimum Degree Credits to Graduate: 120

The Bachelor of University Studies (B.U.S.) degree is a baccalaureate degree program offered through the College of Arts, Humanities and Social Sciences, and is advised through the Career and Advising Center (<https://career-advising.ndsu.edu/>).

Student who would like to pursue the Bachelor of University Studies: General Studies option, need to be eligible for and enrolled in the NDSU Degree Completion Program. Qualifications for this program are as follows:

- Students who do not hold a prior Bachelor's degree
- Students who have not been enrolled in an institution for a minimum of 2 years (24 consecutive months)
- Students who have earned a minimum of 60 credits
- Students who have a minimum 2.0 Cumulative Grade Point Average

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{*†}		
Global Perspectives (G) ^{*†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Veterinary Technology

Department Information

- **Department Location:**
Robinson Hall
- **Department Web Site:**
www.ag.ndsu.edu/vettech/ (<http://www.ag.ndsu.edu/vettech/>)
- **Credential Offered:**
B.S.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/veterinary-technology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/veterinary-technology/>)

Major Requirements

Major: Veterinary Technology

Degree Type: B.S.

Minimum Degree Credits to Graduate: 120

University Degree Requirements

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

[†] General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Major Requirements

A grade of 'C' or better is required in all courses listed as a Major Requirement.

Code	Title	Credits
Required Core Courses for Pre-Vet Tech		
ANSC 218	Anatomy and Physiology of Domestic Animals	3
ANSC 219	Anatomy and Physiology Laboratory	1
VETS 101 or ANSC 201	Student Success Techniques: Veterinary Technology Student Success Techniques - Nontraditional & Transfer Students	1
VETS 115	Medical Terminology for the Paraprofessional	1
Required Core Courses for Professional Vet Tech: Must be admitted to the professional program to take the following courses.		
VETS 249	Veterinary Hospital Information and Procedures	2
VETS 255	Veterinary Diagnostic Imaging	2
VETS 255L	Veterinary Diagnostic Imaging Laboratory	1
VETS 265	Veterinary Nursing I	2
VETS 265L	Veterinary Nursing Lab I	1
VETS 267	Veterinary Nursing II	2
VETS 267L	Veterinary Nursing Lab II	1
VETS 296	Field Experience/Practicum (Ward Care / Clinic Care) ¹	4
VETS 367	Principles of Companion Animal Dentistry	1
VETS 367L	Principles of Companion Animal Dentistry Lab	1
VETS 369	Companion Small Mammal and Exotic Animal Health and Husbandry	2
VETS 385	Veterinary Parasitology	2
VETS 385L	Veterinary Parasitology Lab	1
VETS 386	Veterinary Hematology	2
VETS 386L	Veterinary Hematology Lab	1
VETS 387	Veterinary Clinical Pathology	2
VETS 387L	Veterinary Clinical Pathology Laboratory	1
VETS 455	Veterinary Applied Pharmacy Practices	1
VETS 457	Veterinary Pharmacology	2
VETS 460	Vet Anesthesiology	2
VETS 460L	Veterinary Anesthesiology Lab	1
VETS 461	Veterinary Surgical Nursing Techniques	2
VETS 461L	Veterinary Surgical Techniques Laboratory	1
VETS 482	Large Animal Techniques	2
VETS 483	Clinical Veterinary Practicum	1
VETS 485	Veterinary Technology Externship (Capstone Course)	3
Related Core Courses Required for Professional Program		
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC 370	Fundamentals/Animal Disease	3
ANSC 371	Fundamentals of Animal Disease II	3
BIOL 111 or BIOL 150	Concepts of Biology (May satisfy general education category S) General Biology I	3
CHEM 117 or CHEM 121	Chemical Concepts and Applications (May satisfy general education category S) General Chemistry I	3
CSCI 114 or TL 116	Computer Applications (May satisfy general education category S) Business Software Applications	3

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab (May satisfy general education category S)	3
Total Credits		72

¹ VETS 296 Field Experience (Ward Care / Clinic Care) requires multiple enrollments. Students are to register four different times for this one-credit course.

Degree Requirements and Notes:

- Transfer grades must be 'C' or better to count towards major requirements.
- The following minor programs of study are suggested to supplement this major program of study: Agribusiness, Animal Science, Business Administration, Equine Science, Large Animal Veterinary Technology, Microbiology, Psychology, or Range Science

Veterinary Technology

Department Information

- **Department Location:**
Robinson Hall
- **Department Phone:**
701-231-7641
- **Department Email:**
ndsu.ansc@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/vettech/ (<http://www.ag.ndsu.edu/vettech/>)
- **Credential Offered:**
B.S.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/veterinary-technology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/veterinary-technology/>)

The veterinary technology program at North Dakota State University will prepare you for an exciting career in animal health care. As a veterinary technologist, you may choose to work in a large animal, small animal, exotic animal, or lab animal veterinary practice. Our graduates also find exciting careers in areas such as: serving as a research technician, working with breed and industry associations, veterinary sales and marketing, veterinary practice management, or animal-related business management. Many potential career opportunities await you as an NDSU veterinary technology graduate.

The Program

Veterinary Technology is a Bachelor of Science degree program within the Department of Animal Sciences. Departmental offices are located in Hultz Hall and Robinson Hall, on the west side of the main NDSU campus. Veterinarians and credentialed veterinary technologists comprise the primary faculty and staff, with other animal health and animal sciences professionals also teaching in the program.

The first year of the program is a pre-professional course of study that allows students the opportunity to decide if they want to apply for the limited-enrollment professional portion of the program. Courses offered to first year students include Introduction to the Veterinary Profession, Anatomy and Physiology of Domestic Animals, and Medical Terminology for the Paraprofessional. If, for any reason, you do not continue into the professional portion of the program, the credits earned during the first year may be transferred into other majors.

The professional portion of the program, which starts in the fall of the second year, is selective. Students must submit a supplemental application by May 1 of their first year in order to be considered for admission into the professional program. Detailed application and selection information is provided during spring semester classes and is available at <http://www.ndsu.edu/vettech> (<http://www.ndsu.edu/vettech/>).

Professional Program Selective Admission

All students wishing to continue on in the professional program must submit supplemental application materials. Transfer students are encouraged to contact the department early for information if they intend to transfer to NDSU and pursue veterinary technology. All students must have completed 12 credits at NDSU. In addition to the application form, students must submit official transcripts, an essay regarding the profession, verification of veterinary clinic observation hours, have completed VETS 115, and have taken a scholastic reading and writing exam. During the early summer, applications are evaluated and students are notified regarding program acceptance.

Professional Program

Topics in the professional portion of the program include veterinary nursing, clinical laboratory procedures, radiography, pharmacology, anesthesiology, hospital procedures, surgical nursing, and animal disease. Students work with a diverse group of animals, including cattle, sheep, pigs, horses,

dogs, cats, birds, and exotics. In addition to lectures and demonstrations, students gain a great deal of practical experience. Professional program students participate in clinical practicums and, after successful completion of all the veterinary technology courses, enroll in a clinical externship. Most students complete their externship in a veterinary clinic, but students with particular interests have done their externships at facilities such as zoos, research laboratories, and animal rehabilitation facilities. Your entire academic career is planned to allow you to achieve your career goals and adapt to individual employment needs after you graduate. A minor in large animal veterinary technology, available only to veterinary technology majors, is available for students interested in careers working with livestock and/or horses.

Veterinary Technology Curriculum

With the guidance of your faculty advisor, you will formulate a course schedule that allows you to complete the veterinary technology program requirements. With the general elective courses necessary for graduation, you will be able to satisfy the requirements for a number of minor fields of study.

Financial Aid and Scholarships

Part-time work and work-study programs are available in several different livestock units, the equine center, and in animal science laboratories within the department. Over \$50,000 in departmental scholarships are awarded to students within the Department of Animal Sciences, including Veterinary Technology majors, annually. In addition, the College of Agriculture, Food Systems, and Natural Resources awards scholarships each year to incoming freshman and current NDSU students. Veterinary Technology students may also apply for the LuAnn Lee Memorial Scholarship. For more information on college scholarships, visit <https://www.ag.ndsu.edu/academics/scholarships> (<https://www.ag.ndsu.edu/academics/scholarships/>).

Student loan, grant and work-study information is available from the Office of Financial Aid and Scholarships, and One Stop <https://www.ndsu.edu/onestop/finaid/>.

The Veterinary Technology Club and Extra-Curricular Activities

The Veterinary Technology Club is open to any student interested in veterinary technology. It provides a social setting for students with common career goals and an opportunity to become involved in professional and community activities. The club meets twice monthly during the school year. Information about the club is available from the veterinary technology academic advisors.

NDSU offers a wide variety of other student led clubs, including Saddle and Sirloin, Dairy Club, Rodeo Club, Horseman's Association, Collegiate Cattlemen, Range Club, Anthrozoology Club, and Collegiate FFA.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
ANSC 114		3 ANSC 223	2
ANSC 218		3 BIOL 111 (S)	3
ANSC 219		1 COMM 110 (C)	3
ENGL 110 (C)		3 CSCI 114	3
MATH 104 (R)		3 ENGL 120 (C)	3
VETS 101		1 VETS 115	1
		14	15
Second Year			
Fall	Credits	Spring	Credits
ANSC 370		3 Humanities/Fine Arts Gen Ed	3
MICR 202		2 VETS 255	2
MICR 202L		1 VETS 255L	1
VETS 249		2 VETS 267	2
VETS 265		2 VETS 267L	1
VETS 265L		1 VETS 296 (Ward Care/Clinic Care)	1
VETS 296 (Ward Care/Clinic Care)		1 VETS 385	2
Humanities/Fine Arts Gen Ed		3 VETS 385L	1

VETS 455		1
15		14
Third Year		
Fall	Credits	Spring Credits
VETS 296 (Ward Care/Clinic Care)		1 CHEM 117 3
VETS 369		2 VETS 296 (Ward Care/Clinic Care) 1
VETS 386		2 VETS 387 2
VETS 386L		1 VETS 387L 1
VETS 457		2 VETS 461 2
VETS 460		2 VETS 461L 1
VETS 460L		1 VETS 482 2
Elective		3 VETS 483 1
		Social and Behavioral Sciences Gen Ed (Category B) 3
14		16
Fourth Year		
Fall	Credits	Spring Credits
VETS 485		3 ANSC 371 3
Upper Division Writing Gen Ed		3 Wellness Gen Ed 2
Electives		10 VETS 367 1
		VETS 367L 1
		Electives 6
		Social and Behavioral Sciences Gen Ed (Category B) 3
16		16

Total Credits: 120

Wellness

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8211
- **Department Web Site:**
www.ndsu.edu/hse/undergraduate_studies/majorsminors/ (http://www.ndsu.edu/hse/undergraduate_studies/majorsminors/)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/wellness/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/wellness/>)

The wellness minor takes an integrative approach to examining human health and wellness. The Dimensions of Wellness provides the framework in which students will gain knowledge and learn about skills needed to optimize health across the lifespan.

Courses available within the minor represent a broad array of academic programs and departments, highlighting the interdisciplinary nature of human health and wellness and an opportunity for students to pursue areas of interest within the minor. There are 4 required courses. In addition, students choose 2 courses from the listed elective courses. The elective courses cannot be from the major area of study. A minimum of 8 credits must be taken at North Dakota State University for the minor to be awarded.

Wellness

Department Information

- **Department Location:**
E. Morrow Lebedeff Hall
- **Department Phone:**
701-231-8211
- **Department Web Site:**
www.ndsu.edu/hde/undergraduate_studies/minors/ (http://www.ndsu.edu/hde/undergraduate_studies/minors/)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/wellness/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/wellness/>)

Minor Requirements

Minor: Wellness

Required Credits: 18

Code	Title	Credits
Required Courses		
HNES 111	Wellness	3
HDFS 186	Consumer and Society	3
HDFS 242	Couples, Marriages and Families	3
ADHM 410	Dress in World Cultures	3
or ADHM 411	Food and World Cultures	
Elective Courses: Select 2 of the following. Courses cannot be from the major area of study.		6
ADHM 486	Dress and Human Behavior	
COMM 212	Interpersonal Communication	
HNES 200	Principles of Nutrition	
HNES 217	Personal and Community Health	
RELS 100	World Religions	
SOC 115	Social Problems	
SOC 214	Social Interaction	
Total Credits		18

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.

Women and Gender Studies

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-7290
- **Department Web Site:**
www.ndsu.edu/wgs/ (<http://www.ndsu.edu/wgs/>)
- **Credential Offered:**
B.S.; B.A.
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/women-gender-studies/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/women-gender-studies/>)

The NDSU Women and Gender Studies program is an interdisciplinary academic program that focuses on women and gender issues in society, while integrating the teaching, research, and service goals of our land grant university. The undergraduate program offers a major and minor, and it has internal tracks that allow students to pursue focused studies in areas such as gender and public health. The Women and Gender Studies program requirements also complement various other degrees for students interested in double majoring.

CAREER OPPORTUNITIES (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/major_and_minor/)

A Women and Gender Studies degree provides students with critical fieldwork experience that helps them find job placement after graduation. As a field committed to fostering justice for all, students are offered opportunities for working with local groups, organizations, and businesses that focus on women, gender, and sexuality. Students majoring in Women and Gender Studies complete an internship that places feminist theory into practice. Student experiences have included work with the YWCA, Rape and Abuse Crisis Center of Fargo-Moorhead, and others.

Upon graduation, our students are well poised to find positions that match their career goals or to pursue graduate programs. Increasingly, employers seek candidates who understand and support diversity and inclusiveness, which is a foundational principle in the Women and Gender Studies program. In NDSU's 2019 Career Placement Report, Women and Gender Studies graduates had 100% placement. Our graduates regularly find employment as social workers, directors of non-profit organizations, lawyers, lobbyists, counselors, professors, and librarians.

Program Learning Objectives

Women and Gender Studies examines gender in society and aims to raise students' aspirations, expand awareness of their capabilities, and widen the knowledge and development of all.

Upon graduation, Women and Gender Studies students will be able to:

1. Analyze how the social construction of gender and sex affects individual experiences
2. Examine how privilege and oppression function in society and culture
3. Explore how feminism and activism are intertwined by studying ways that diverse individuals, groups, and communities can work to affect change
4. Analyze how social categorizations of one's identity, such as race, gender, socioeconomic class, sexual orientation, and gender identity, intersect and affect a person's lived experiences
5. Construct evidence-based arguments within their own interdisciplinary fields of inquiry that use a variety of credible sources.
6. Explore the implications of engaged citizenship

The Curriculum

The Women and Gender Studies major (<https://www.ndsu.edu/wgs/curriculum/>) consists of a total of 33 approved semester credits. Students must take 7 core courses and 12 approved elective credits in their area of choice.

The Women and Gender Studies minor (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/undergraduate_minor/) consists of a total of 18 approved semester credits. Students must take two required courses; then they may take four of any of the courses listed as core courses. Appropriate courses not on either the required or core list must be approved by the program administrators.

GENERAL EDUCATION

Multiple Women and Gender Studies classes—namely WGS 110: Introduction to Women's Studies, WGS 112: Introduction to Masculinities, and WGS 370: Transnational/Global Women— fulfill both core requirements for the WGS major/minor as well as North Dakota State University's cultural diversity general education requirements. This allows students to advance towards a timely completion of their degree.

CONTACT

To begin your academic career in the WGS program, contact the Director, Dr. Ashley Baggett, at ashley.baggett@ndsu.edu.

Sample Program Guide

Please note this is a sample program guide and not an official curriculum. Actual student schedules for each semester will vary depending on start year, education goals, applicable transfer credit, and course availability. Once admitted, students are encouraged to work with their assigned academic advisor on a regular basis to review degree progress.

First Year			
Fall	Credits	Spring	Credits
COMM 110		3 ENGL 120	3
ENGL 110		3 Humanities and Fine Arts Gen Ed	3
Humanities and Fine Arts Gen Ed		3 Science and Technology Gen Ed	3

Social/Behavioral Science Gen Ed	3	Social/Behavioral Science & Global Perspective Gen Ed	3
Science/Technology Gen Ed	3	Quantitative Reasoning Gen Ed	3
15		15	
Second Year			
Fall	Credits	Spring	Credits
WGS 110		3 WGS 112	3
WGS elective		3 WGS elective	3
AHSS Req 1		3 AHSS Req 2	3
Science/Technology w/ Lab Gen Ed		4 Wellness Gen Ed	2
Second major or minor		3 Second major or minor	3
16		14	
Third Year			
Fall	Credits	Spring	Credits
WGS 340		3 WGS 370	3
WGS elective		3 WGS elective	3
AHSS Req 3		3 Upper division writing	3
Second major or minor		3 Second major or minor	3
Second major or minor		3 Second major or minor	3
15		15	
Fourth Year			
Fall	Credits	Spring	Credits
SOC 424		3 WGS 350	3
WGS elective		3 WGS 489	3
WGS elective		3 Second major or minor	3
Second major or minor		3 Second major or minor	3
Second major or minor		3 Second major or minor	3
15		15	
Total Credits: 120			

Women and Gender Studies

Department Information

- **Department Location:**
Morrill Hall
- **Department Phone:**
701-231-7290
- **Department Web Site:**
www.ndsu.edu/wgs/ (<http://www.ndsu.edu/wgs/>)
- **Credential Offered:**
B.S.; B.A.
- **Plan Of Study Sample:**
bulletin.ndsu.edu/programs-study/undergraduate/women-gender-studies/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/women-gender-studies/>)

Major Requirements

Major: Women & Gender Studies

Degree Type: B.A. or B.S.

Minimum Degree Credits to Graduate: 120**University Degree Requirements**

1. Satisfactory completion of all requirements of the curriculum in which one is enrolled.
2. Earn a minimum total of 120 credits in approved coursework. Some academic programs exceed this minimum.
3. Satisfactory completion of the general education requirements as specified by the university.
4. A minimum institutional GPA of 2.00 based on work taken at NDSU.
5. At least 36 credits presented for graduation must be in courses numbered 300 or higher.
6. Transfer Students: Must earn a minimum of 60 credits from a baccalaureate-degree granting or professional institution.
 - a. Of these 60, at least 36 must be NDSU resident credits as defined in #7.
 - b. Within the 36 resident credits, a minimum of 15 must be in courses numbered 300 or higher and 15 credits in the major field of study.
7. At least 36 credits must be NDSU resident credits. Resident credits include credits registered and paid for at NDSU.

For complete information, please refer to the Degree and Graduation Requirements (p. 63) section of this Bulletin.

University General Education Requirements

Code	Title	Credits
Communication (C)		12
ENGL 110	College Composition I	
ENGL 120	College Composition II	
COMM 110	Fundamentals of Public Speaking	
Upper Division Writing [†]		
Quantitative Reasoning (R) [†]		3
Science and Technology (S) [†]		10
Humanities and Fine Arts (A) [†]		6
Social and Behavioral Sciences (B) [†]		6
Wellness (W) [†]		2
Cultural Diversity (D) ^{**†}		
Global Perspectives (G) ^{**†}		
Total Credits		39

* May be satisfied by completing courses in another General Education category.

† General education courses may be used to satisfy requirements for both general education and the major, minor, and program emphases, where applicable. Students should carefully review major requirements to determine if specific courses can also satisfy these general education categories.

- A list of university approved general education courses and administrative policies are available here (p. 56).

Arts, Humanities, and Social Sciences**Degree Requirements**

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		

Area Two: Social Sciences	3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS	
Area Three: Fine Arts	3
ARCH, ART, ENVD, LA, MUSC, or THEA	
Total Credits	9

Major Requirements

Code	Title	Credits
Women & Gender Studies Major		
SOC 424	Feminist Theory and Discourse	3
WGS 110	Introduction to Women's Studies (May satisfy general education category A and D)	3
WGS 112	Introduction to Masculinities (May satisfy general education category A and D)	3
WGS 340	Perspectives in LGBTQ Studies	3
WGS 350	Perspectives in Women's Studies	3
WGS 370	Transnational/Global Women	3
WGS 489	Internship/Capstone	3
Electives: Select 12 credits from the following:		12
CJ 465	Gender, Race and Ethnicity in Criminal Justice	
COMM 216	Intercultural Communication (May satisfy general education category B and D)	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	Women's Writing (May satisfy general education category A and D)	
ENGL 335	Multicultural Writers (May satisfy general education category A and D)	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
FREN 345	Women in French Literature	
HDFS 230	Life Span Development (May satisfy general education category B)	
HDFS 242	Couples, Marriages and Families (May satisfy general education category W)	
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
HDFS 353	Children, Families and Public Policy	
HDFS 448	Issues In Sexuality	
HDFS 468	Families and Work	
HIST 259	Women in European History 1400-1800	
HIST 426	Women in American History	
PSYC 210	Human Sexuality (May satisfy general education category B)	
PSYC 250	Developmental Psychology (May satisfy general education category B)	
SOC 235	Cultural Diversity (May satisfy general education category B and D)	
SOC 410	Social Inequality	
SOC 412	Sociology of Gender (May satisfy general education category B and D)	
SOC 417	Sociology of the Family	
SOC 439	Social Change	
WGS 496	Field Experience	
Total Credits		33

Minor Requirements

Minor: Women & Gender Studies

Required Credits: 18

Code	Title	Credits
Required Courses		
WGS 110	Introduction to Women's Studies	3

WGS 350	Perspectives in Women's Studies	3
Core Courses: Select 12 credits of the following		12
CJ 310	Women and Policing	
CJ 465	Gender, Race and Ethnicity in Criminal Justice	
COMM 216	Intercultural Communication	
COMM 380	Health Communication I	
COMM 383	Organizational Communication I	
COMM 412	Gender and Communication	
ENGL 330	Women's Writing	
ENGL 335	Multicultural Writers	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
FREN 345	Women in French Literature	
HDFS 230	Life Span Development	
HDFS 242	Couples, Marriages and Families	
HDFS 275	Diversity and Multiculturalism in Individual and Family Life	
HDFS 353	Children, Families and Public Policy	
HDFS 448	Issues In Sexuality	
HDFS 468	Families and Work	
HIST 259	Women in European History 1400-1800	
HIST 260	Women In America	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
PSYC 210	Human Sexuality	
PSYC 250	Developmental Psychology	
SOC 235	Cultural Diversity	
SOC 417	Sociology of the Family	
SOC 424	Feminist Theory and Discourse	
SOC 439	Social Change	
WGS 112	Introduction to Masculinities	
WGS 340	Perspectives in LGBTQ Studies	
WGS 370	Transnational/Global Women	

Total Credits **18**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU

Zoology

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
Minor
- **Official Program Curriculum:**
bulletin.ndsu.edu/undergraduate/program-curriculum/zoology/ (<http://bulletin.ndsu.edu/undergraduate/program-curriculum/zoology/>)

Zoology, the study of animals, is a diverse field with specialties that range from cells (cytologists, molecular biologists, geneticists), to organisms (anatomists, physiologists, entomologists, mammalogists, ornithologists), to populations and their relation to each other and to their environment (ethologists, ecologists).

Zoology

Department Information

- **Department Location:**
Stevens Hall
- **Department Phone:**
701-231-7087
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Credential Offered:**
Minor
- **Program Overview:**
bulletin.ndsu.edu/programs-study/undergraduate/zoology/ (<http://bulletin.ndsu.edu/programs-study/undergraduate/zoology/>)

Minor Requirements

Minor: Zoology

Required Credits: 17

Code	Title	Credits
Required Courses		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
BIOL 359	Evolution	3
Electives: 6 credits from the list below		6
BIOL 364	General Ecology	
BIOL 410	Comparative Chordate Morphology	
BIOL 450	Invertebrate Zoology	
BIOL 452	Ichthyology	
BIOL 454	Herpetology	
BIOL 456	Ornithology	
BIOL 458	Mammalogy	
BIOL 460	Animal Physiology	
BIOL 462	Physiological Ecology	
BIOL 463	Animal Behavior	
BIOL 475	Conservation Biology	
BIOL 476	Wildlife Ecology and Management	
BIOL 477	Wildlife and Fisheries Management Techniques	
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- *Biological Sciences Majors: Electives taken for the Biological Sciences major cannot be double-counted with the Zoology minor. The only classes that can be double counted are BIOL 150/150L, 151/151L, and 359.*

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* Program Available Online

Accountancy

Department Information

- **Program Coordinator:**
Jill M. Zuber, Ph.D.

- **Phone:**
Barry Hall 200B
- **Email:**
jill.zuber@ndsu.edu
- **Department Phone:**
(701) 231-8651
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/macc/ (<http://www.ndsu.edu/business/programs/graduate/macc/>)
- **Application Deadline:**
Applications are reviewed on a rolling schedule.
- **Credential Offered:**
M.Acc.
- **Test Requirement:**
GMAT 550 or GRE
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5

Program Description

The Master of Accountancy (MAcc) program at North Dakota State University (NDSU) is a non-thesis, professional program delivered face-to-face in Barry Hall, located in downtown Fargo. This program emphasizes technical competency, accounting theory, and research skills necessary for students to start and excel in their accounting careers. Students will be prepared to identify accounting issues, research the appropriate standards and tax law, analyze data, present possible solutions and recommend actions. Qualified students may complete the program in 11 months. However, students are welcome to earn their degree on a part-time or full-time basis. In addition, students with undergraduate degrees in other areas of business or even unrelated to business can enter the graduate program to prepare for a challenging and rewarding accounting career once they have completed the prerequisite accounting core courses.

The Master of Accountancy program at NDSU is designed for students wishing to enter and accelerate their careers in public accounting, private industry, fraud investigation, or cost management. Students will develop the knowledge and skills necessary to be successful in their chosen area and also enhance their ability to pass professional certifications, such as the Certified Public Accountant (CPA), Certified Management Accountant (CMA), and/or Certified Fraud Examiner (CFE). Our approach to learning involves creating a collaborative environment in which students can further develop a deeper understanding and knowledge of accounting and their critical thinking and analytical skills. We believe our face-to-face classes allow students to develop close relationships with their colleagues and the faculty. Such an environment encourages a strong learning community where important questions can be asked and answered.

Through the College of Business at NDSU, the Master of Accountancy program is accredited by the Association to Advance Collegiate Schools of Business (AACSB).

Admission Requirements

A. Admission requirements for NDSU accounting majors

1. The applicant's overall undergraduate GPA should be at least 3.0 on a 4.0 scale.
2. The applicant's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.
3. The applicant does not have to complete the GMAT, if the student meets the minimum GPA requirements (requirements A.1. and A.2.).
4. If the applicant's GPA is below the 3.0 standards (requirements A.1. and A.2.), conditional admission to the program *may* be allowed under the following conditions:
 - 4.1. The student has significant post-graduation work experience OR
 - 4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.
5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree. Names of two NDSU accounting professors must be entered on the application, but no references are required.
6. If the above requirements are not met, the applicant *may* be granted conditional admission.
7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

B. Admission Requirements for Students Graduating with Accounting Major from Tri-College Schools, North Dakota four-year not-for-profit schools and AACSB accredited Schools

1. The student's overall GPA should be at least 3.0 on a 4.0 scale.
2. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.
3. Applicants do not have to complete the GMAT, if the student meets the minimum GPA requirements (Requirements B.1. and B.2.).
4. If the student's GPA is below the 3.0 standards (Requirements B.1. and B.2.), conditional admission to the program *may* be allowed under the following conditions:
 - 4.1. The student has significant post-graduation work experience OR
 - 4.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.
5. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.
6. If the above requirements are not met, the student *may* be granted conditional admission.
7. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

C. Admission Requirements for All Others

1. The student has an undergraduate degree from a regionally accredited school.
2. The student's overall GPA should be at least 3.0 on a 4.0 scale.
3. The student's GPA for upper-division accounting courses should be at least 3.0 on a 4.0 scale.
4. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.
5. If the student has not completed all of the following core courses or their equivalent in their undergraduate program, the student *may* be conditionally admitted to the program.

5.1. Core courses

- 5.1.1. ACCT 311 (Intermediate Accounting I)
- 5.1.2. ACCT 312 (Intermediate Accounting II)
- 5.1.3. ACCT 320 (Cost Accounting)
- 5.1.4. ACCT 418 (Tax I)
- 5.1.5. ACCT 421 (Audit I)

5.2. The student will be expected to complete any missing core courses within the first two semesters of the program.

5.3. Students must meet the minimum GPA standard of 3.0 for all of the core courses for final acceptance into the program.

6. If the student's undergraduate GPA is below the 3.0 standards (Requirements C.2. and C.3.), conditional admission to the program *may* be allowed under the following conditions:
 - 6.1. The student has significant post-graduation work experience OR
 - 6.2. The student takes the Graduate Management Admissions Test (GMAT) with an expectation that the student earn a score of at least 550.
7. Students must also submit a letter stating reasons for wanting a Master of Accountancy degree and two letters of recommendation.
8. If the above requirements are not met, the student *may* be granted conditional admission.
9. Conditional admission is granted solely at the discretion of the program coordinator and/or admissions committee.

D. Conditional status expires and regular admission is granted if the applicant meets the terms of their conditional admission. See sections A.6., A.7., B.6., B.7., C.8. and C.9. above.

E. A student who attended a university outside of the United States must submit a course-by-course transcript evaluation from World Education Services (WES). See www.wes.org.

Financial Assistance

A limited number of graduate assistantships are available each semester through the Master of Accountancy program. The program coordinator will send an application for the assistantship to all eligible students who have applied to the program by the application deadlines.

Program Curriculum

The total course requirements necessary to complete the MAcc degree will vary depending on the background of the student. Students without an undergraduate accounting degree will be required to take a core of undergraduate accounting courses in addition to the graduate courses required for the degree. Please refer to the core accounting course list at the end of this page. A student with an academic background in accounting will need to take ten (10) graduate-level courses (30 semester credit hours) and may complete the degree in as little as eleven months depending on the number of courses a student desires to take in a semester. Students may choose to pursue the degree on a part-time or a full-time basis.

The graduate course work for the MAcc degree includes four required courses in accounting theory, applied professional research, legal aspects of business, and information resource management. In addition, the student must take five accounting electives from a list of ten courses that includes fraud examination, taxation, management control systems, advanced auditing, and advanced financial accounting and analysis. Finally, the student must take one graduate elective from a list of approved courses or with permission of the program coordinator.

Code	Title	Credits
MIS 770	Information Resources Management	
ACCT 730	Legal Aspects of Business	
ACCT 735	Applied Professional Research	
ACCT 750	Accounting Theory	
Total Required Credit Hours		12
Select 5 of the following:		15
ACCT 610	Fraud Examination ¹	
ACCT 611	Advanced Fraud Examination ¹	
ACCT 615	Advanced Accounting ¹	
ACCT 619	Tax Accounting II ¹	
ACCT 620	Accounting Information Systems ¹	
ACCT 625	Government and Not-for-Profit Accounting ¹	
ACCT 640	Management Control Systems ¹	
ACCT 722	Auditing II	
ACCT 725	International Financial Reporting Standards	
ACCT 755	Financial Statement Analysis	
Select one* of the of the following:		3
FIN 610	Investment Analysis and Management	
FIN 620	Options, Futures, and Other Derivatives	
FIN 630	Management of Financial Institutions	
FIN 640	International Finance	
FIN 650	Advanced Bank Management	
FIN 670	Analysis of Fixed-Income Securities	
MRKT 610	Consumer Behavior	
MRKT 620	Advertising and Integrated Marketing Communication	
MRKT 630	Sales and Personal Selling	
MRKT 634	Sales Management	
MRKT 640	International Marketing	
MRKT 650	Marketing Research	
MRKT 670	Services Marketing	
MGMT 630	Leadership in Organization	
MGMT 640	International Management	
MGMT 650	Human Resource Management	
MGMT 651	Negotiation and Alternative Dispute Resolution	
MGMT 652	Compensation Management	
MGMT 654	Labor-Management Relations	
MGMT 661	Supply Chain Management	
MGMT 671	Leading the Nonprofit Organization	
ACCT 696	Special Topics	
ACCT 793	Individual Study/Tutorial	

*The elective course must be pre-approved by the Master of Accountancy (MAcc) Director in writing.

Total Credits	30
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- ¹ Students cannot take the 600-level course if they took the 400-level course
- ² Summer courses are offered when student enrollment numbers meet the required minimum.

CORE UNDERGRADUATE ACCOUNTING COURSES: You must have completed the following courses or their equivalent.

Code	Title	Credits
ACCT 311	Intermediate Accounting I	4
ACCT 312	Intermediate Accounting II	4
ACCT 320	Cost Management Systems	3
ACCT 418	Tax Accounting I	3
ACCT 421	Auditing I	3

Faculty

James W. Clifton, CPA, CFE

Assistant Professor of Accounting Practice
Speciality: Accounting, Fraud, and Taxation

Thomas D. Dowdell, PhD

Professor
Speciality: Accounting and Auditing

Nancy J. Emerson, CPA, MAS

Senior Lecturer
Speciality: Accounting and Government/Nonprofit Accounting

Lindsey DiFiore, CPA

Lecturer
Speciality: Accounting and Fraud

Yongtao (David) Hong, PhD

Associate Professor
Speciality: Advanced Accounting, International Standards, and Theory

Michael J. Petersen, PhD, CMA, CFM

Associate Professor
Speciality: Accounting and Cost Management

Limin Zhang, PhD

Associate Professor
Speciality: Management Information Systems

Jill M. Zuber, PhD, CPA

Associate Professor
Speciality: Accounting and Taxation

Agribusiness and Applied Economics

Department Information

- **Department Location:**
500 Barry Hall
- **Department Phone:**
(701) 231-7441
- **Department Email:**
ndsu.agribusiness@ndsu.edu
- **Department Web Site:**
www.ag.ndsu.edu/agecon/ (<http://www.ag.ndsu.edu/agecon/>)
- **Application Deadline:**

March 1

- **Credential Offered:**
M.S.
- **Test Requirement:**
GRE or GMAT
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Agribusiness and Applied Economics Master of Science degree includes areas of specialization in applied economics, agribusiness, and transportation and logistics.

The Applied Economics area emphasizes course work in economic theory, research methods, and quantitative techniques. The option is designed to prepare students for careers in agricultural economics research in private and public sectors and for Ph.D. programs at other institutions.

The Agribusiness specialization is a broad-based program which combines training in agribusiness management, economic analysis, and agricultural sciences. Training may include biotechnology, processing, and food and environmental safety. Students are prepared for a variety of successful careers in agribusiness by fulfilling the requirements for expertise in quantitative methods and developing a rigorous background in economic theory and research.

The Departments of Agribusiness and Applied Economics and Civil Engineering, in conjunction with the Upper Great Plains Transportation Institute, offer an interdisciplinary graduate program in multimodal transportation. The program includes rural and non-metropolitan planning, highway and railroad engineering, freight transportation operations and economics, and agribusiness logistics and distribution. Both thesis and comprehensive study options are available.

Students of all options have complete access to well-equipped research facilities and to faculty supervision time. The department has an excellent placement record with national and international agricultural and business firms, as well as government agencies.

In addition to the Graduate School admission requirements (<https://bulletin.ndsu.edu/graduate/admission-information/>), applicants to the program must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show potential for successful graduate study, may be admitted under a conditional status. Evidence must be provided showing that the applicant's potential is not adequately reflected by his/her record. After meeting the specified standards of performance set by the department, the student, in consultation with the major adviser, may request a change to full graduate standing.

Financial Assistance

The department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

All students pursuing a M.S. in Agribusiness and Applied Economics must complete all core courses. Students select elective courses (with approval of the adviser and supervisory committee) to fulfill the remaining Graduate College credit requirements. It is required that students have competence in calculus, multiple regression analysis, and intermediate microeconomics.

Code	Title	Credits
Required Courses (both options)		
AGEC 701	Research Philosophy	1
ECON 710	Advanced Econometrics	3
AGEC 739	Analytical Methods for Applied Economics	3
AGEC 741	Advanced Microeconomics	3
Plan A: Thesis Option		
Courses numbered 601-689, 691; 700-789, 791; 800-889 and 891		6
AGEC 798	Master's Thesis	

Plan B: Comprehensive Study Option

ECON 610	Econometrics	3
Courses numbered: 601-689, 691; 700-789, 791; 800-889 and 891		8
AGEC 797	Master's Paper (2-4 credits)	
Minimum Total Credits:		30

David Bullock, Ph.D.

Iowa State University, 1989

Research Interests: Futures and Options Markets, Over-The-Counter Derivatives, Trading, Risk Management, Agrifinance, Monte Carlo Simulation, and Big Data Applications in Agriculture

James Caton, Ph.D.

George Mason University, 2016

Research Interests: Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

Erik Hanson, Ph.D.

University of Minnesota, 2016

Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.

Washington University in St. Louis, 2008

Research Interests: Microeconomics, Political Economy, Public Finance

Thomas Krumel, Ph.D.

University of Connecticut, 2020

Research Interests: Rural Development, Labor Demand, and Labor Market Skills Mismatch

Kerianne Lawson, Ph.D.

West Virginia University, 2021

Research Interests: Economic Development, Economic Freedom, Law and Economics, Energy Economics

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Raymond March, Ph.D.

Texas Tech University, 2017

Research Interests: Public and Private Provision and Governance of Health Care in the United States

Dragan Miljkovic, Ph.D.

University of Illinois, 1996

Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

William Nganje, Ph.D.

University of Illinois at Urbana-Champaign, 1999

Research Interests: Agricultural Finance, Food Safety Economics

Bryon Parman, Ph.D.

Kansas State University, 2013

Research Interests: Whole Farm and Agribusiness Financial Structure, Risk Management, Land Values and Rents, and Farm Financial Trends

Frayne Olson, Ph.D.

University of Missouri, 2007

Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.

North Dakota State University, 1973

Research interests: Livestock Marketing

Xudong Rao, Ph.D.

University of Minnesota, 2015

Research Interests: Farm and Agribusiness Management, Risk Analysis, Efficiency and Productivity, Technology Adoption, Food and Agricultural Policy, International Agricultural Development

Veeshan Rayamajhee, Ph.D.

University of New Mexico, 2019

Research Interests: Individual and Collective Responses to Covariate Shocks

David Ripplinger, Ph.D.

North Dakota State University, 2011

Research Interests: Production Economics and Marketing

David Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

Anupa Sharma, Ph.D.

Virginia Polytechnic Institute and State University, 2016

Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.

Michigan State University, 1994

Research Interests: Agribusiness

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

An accelerated Master of Science program is available for students currently enrolled in the undergraduate economics, agricultural economics, and agribusiness programs at North Dakota State University. Students will be required to complete 30 credits consisting of 16 graduate-level didactic credits (600/700 level), maintain a graduate GPA of 3.0, and complete a thesis or paper.

Nine (9) of the didactic credits can be used to meet the requirement for the B.S. degree. Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available at any time after being accepted into the accelerated MS program. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability. Differential tuition applies. Graduate tuition rates will apply to graduate level courses while undergraduate tuition applies to undergraduate courses.

Eligibility and Admission

A Combined/Accelerated Degree Program Declaration form (<https://dmsforms.ndus.edu/iFiller/iFiller.jsp?fref=6876b8bb-fe59-437c-852c-310fb76e8475>) is required and should be submitted before a student's senior year.

At the time of application, the student:

- Must have completed at least 60 credits towards their B.S. degree before conditional admission.
- Must have completed at least 30 credits at NDSU before conditional admission.
- Must have a cumulative GPA of 3.5 at NDSU to be eligible for conditional admission.
- Must have completed intermediate microeconomics (ECON 341) with a grade of B or higher, calculus (Math 144 or higher) with a grade of C or higher, and linear regression (STAT 331 or 461) with a grade of B or higher.

Rules for Accepted Students

All admissions are conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.

- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to being accepted to the program may be counted toward a M.S. degree.
- A maximum of 9 credits in the M.S. program can be used to meet the requirements for the B.S. degree.
- Students entering the M.S. degree with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability.

Degree Requirements for Accelerated Masters of Science Program

Student must meet all requirements of the Economics, Agribusiness, or Agricultural Economics B.S.; and Agribusiness and Applied Economics M.S. programs to be awarded these degrees. The Graduate School has the following minimum requirements:

- Minimum of 30 credits total.
- Minimum of 16 course credits in 601-689 and/or 700-789 level.

Student Focused. Land Grant. Research University.

Agricultural and Biosystems Engineering

Department Information

- **Acting Department Chair:**
Ken Hellevang, Ph.D.
- **Graduate Coordinator:**
Shafiqur Rahman, Ph.D.
- **Department Location:**
Agricultural and Biosystems Engineering Building
- **Department Phone:**
(701) 231-7261
- **Department Web Site:**
www.ndsu.edu/aben/ (<http://www.ndsu.edu/aben/>)
- **Application Deadline:**
International applications are due May 1st for fall and August 1 for spring. Domestic applications must be received at least one month prior to the start of the semester.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Agricultural and Biosystems Engineering offers graduate study leading to M.S. and Ph.D. degrees. The program emphasizes solving engineering problems for agricultural production, food and biofuels processing, and environmental resources management. Advanced work may involve specialized training in the following areas: irrigation and drainage engineering; agricultural hydrology; soil and water resources management; livestock waste management; air quality, process engineering for food and biofuels, and other bioproducts; agricultural machine systems; precision agriculture; machine vision and intelligent sensors for biological systems; and post-harvest handling and storage of biomass feedstocks and other biological materials.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to agricultural and biosystems engineering programs are fostered.

The Department of Agricultural and Biosystems Engineering graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements and have a baccalaureate degree in engineering or have taken the equivalent of the basic undergraduate engineering courses.

Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Mathematics through Differential Equations (NDSU: MATH 266 Introduction to Differential Equations)
- Statics (NDSU: ME 221 Engineering Mechanics I) and Dynamics (NDSU: ME 222 Engineering Mechanics II); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350 Thermodynamics and Heat Transfer); may be substituted with ABEN 644 Transport Processes, which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 Fluid Mechanics or ME 352 Fluid Dynamics)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252 University Physics II)

Financial Assistance

Research assistantships are available and dependent on the grant funding of faculty research programs. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Students must be accepted into the Graduate School before they are eligible for an assistantship.

M.S. Degree

The M.S. degree program requires completion of 30 semester credit hours beyond the baccalaureate degree as detailed below. A Plan of Study (PoS) should be developed with the adviser by the end of the first semester of work. An oral examination covering the research-based paper or thesis and the student's understanding and ability to apply the subject matter to the research is required. Students typically require two years to complete their MS degree. An overall GPA of 3.0 or higher must be maintained.

The ABEN M.S. program requirements are:

Code	Title	Credits
Didactic Course Work (601-689, 691; 700-789, 791; 800-889 and 891)		16
ABEN 790	Graduate Seminar	
Additional Credits (as needed to complete 30 total credits)		
ABEN 798	Master's Thesis	6-10
Total Credits Required		30

* Minimum of 6 credits of NDSU ABEN courses numbered 601-689, 691; 700-789, 791

† Degree Requirements for the Accelerated M.S. Program in Agricultural and Biosystems Engineering

Students pursuing an accelerated master's degree in ABEN must complete the following requirements:

- 30 credits after the B.S. is required. However, a maximum of 15 graduate credits earned during the combined/accelerated degree program may also be counted toward the graduate degree.
- 20-24 credits are from didactic course work, while 6-10 credits are typically devoted for a master's thesis based on research
- A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required.
- ABEN Graduate Seminar (ABEN 790).

- 30 credits after the B.S.
- 20-24 credit hours are from course work, while 6-10 credit hours are typically provided for a master's thesis
- A minimum of 6 credits of NDSU ABEN courses numbered 601-689 and 700-789 is required
- ABEN Graduate Seminar (ABEN 790)

Ph.D. Degree

Ph.D. candidates are encouraged to indicate their research interests when applying for admission and to select an adviser before entering the program. Typically, 3-4 years are required to complete the Ph.D. program after the completion of an M.S. degree.

The degree requirements are in accordance with the NDSU Graduate School requirements. The student's academic adviser will usually be selected during the acceptance process. Prior to the end of the first academic year, the student and academic adviser will arrange for appointment of a Graduate Advisory Committee.

The student and major adviser will prepare a Plan of Study by the end of the first year in residence. The student's Graduate Advisory Committee, the ABEN Department Chair, and the Dean of the Graduate School shall approve the Plan of Study. The Plan of Study (PoS) must be filed in the Graduate School of NDSU. An overall GPA of 3.0 or above must be maintained.

The ABEN Ph.D. program requirements are:

Code	Title	Credits
Didactic credit (601-689, 691; 700-789, 791; 800-889 and 891)*		27
ABEN 899 and ABEN 790		30-45
Additional Credits (as need to complete 60 credits (post-master's) or 90 credits (post-bachelor's))		
Total credits		60-90

* at least 15 credits of which must be 700-800 level and a minimum of 9 credits must be ABEN courses.

- 60 credits after the M.S. or 90 credits after the B.S.
- A minimum of 27 credits from NDSU courses numbered 601-689 and 700-789, at least 15 credits of which must be numbered 700-789

- A minimum of 30 credits of NDSU ABEN dissertation and graduate seminar after the M.S. or 45 credits after the B.S.
- A minimum of 9 credits of NDSU ABEN courses numbered 601-689 or 700-789, 15 credits if entering with other than an ABEN B.S.
- ABEN Graduate Seminar (ABEN 790)
- It is expected that one or more journal articles will be submitted for publication prior to the award of the degree.

*Any student receiving an M.S. or Ph.D. degree from the NDSU ABEN department must have taken the following fundamental courses prior to attaining the graduate degree. If the courses (or their equivalent) were not taken prior to matriculating at NDSU, they should be taken in addition to other coursework required for the graduate degree.

- Differential Equations (NDSU: Math 266)
- Statics (NDSU: ME 221) and Dynamics (NDSU: ME 222); these two may be substituted by a calculus-based Physics I class
- Thermodynamics (NDSU: ME 350); may be substituted with ABEN 644 which may also count toward graduate degree
- Fluid Mechanics (NDSU: CE 309 or ME 352)
- Physics II/Electricity and Magnetism (NDSU: PHYS 252)

The major adviser may appeal to the ABEN Graduate Committee (not the student's graduate advisory committee) for substitutions or waivers of these requirements.

Examinations

Comprehensive Examinations: Both a written and an oral examination will be taken after completion of the greater portion of the course work phase of the Ph.D. program. The written examination will be conducted to test the student's understanding and ability to apply the subject matter related to the chosen research area(s). The format and sequence of the written and oral examinations are dependent on the academic adviser and the examining committee. The examination will be graded pass, fail or marginal pass. If the student does not pass the written component of the comprehensive examination, the student will be provided another opportunity to pass the examination. If the student does not pass the written examination second time, the student must wait one semester before taking the examination for the third time. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

The oral examination will also be coordinated by the academic adviser. In this examination, the student will be required to provide a short presentation of the research progress to the date of the oral examination. The format of the examination is dependent on the academic adviser and the examining committee. This examination is to assess the student's ability to communicate his/her research problem, and how he/she is applying scientific and engineering principles to solve the research problem. This examination may be used by the committee to further ascertain the student's level of understanding of subject matter as observed from the written examination. This examination is graded pass or fail. If a student fails the oral examination, the student will be advised of the deficiencies and will be given a second opportunity to pass the examination. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee, the Department Chair, and the Dean of the Graduate School after consultation with the Graduate Council. Failure of the third attempt will prevent the student from proceeding further in the Ph.D. program.

Successful completion of both written and oral examinations will formally admit the student into candidacy for the Ph.D. in Agricultural and Biosystems Engineering. At least one semester must elapse between admission to candidacy and final Ph.D. oral examination of the dissertation.

Final Examination: After the research work is completed, the student will write a Ph.D. dissertation following the guidelines of the Graduate School. The final oral Ph.D. examination will be arranged after the approval of his/her academic adviser. The complete Ph.D. dissertation will be distributed to the examining committee members a minimum of one week before the final examination. The student will present the complete research work during this final examination. After passing the final examination, the student will complete all the appropriate suggested changes of the committee. The student will follow the procedures as defined by the Graduate School to complete the submission of the Ph.D. dissertation.

Thomas Bon, Ph.D.

North Dakota State University, 2003

Research Interests: Machine Systems, Electronics and Instrumentation

Igathinathane Cannayen, Ph.D.

Indian Institute of Technology, 1997

Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

J. Paulo Flores

Federal University of Rio Grande do Sul, 2008

Research Interests: Precision Agriculture, Applications of UASs/Drones in Agriculture, UASs/Drone Imagery Analysis, GIS Applications for Precision Agriculture

Kenneth J. Hellevang, Ph.D.

North Dakota State University, 1989

Research Interests: Post Harvest Technology, Structures

Xinhua Jia, Ph.D.

University of Arizona, 2004

Research Interests: Soil and Water Engineering, Hydrology

Zhulu Lin, Ph.D.

University of Georgia, 2003

Research Interests: Water and Soil Resources, Environmental Modeling

Ewumbua Monono, Ph.D.

North Dakota State University, 2015

Research Interests: Application of Engineering to the Science of Bioprocessing, Biofuels, Bioproducts, and Food Safety Engineering

John Nowatzki, M.S.

North Dakota State University, 1974

Research Interests: Agricultural Machine Systems, Precision Agriculture, Conservation Technology, Farm Equipment Energy Conservation, Energy Efficiency, Farm Chemical Application Technology, Wireless Technology on Farms

Matthew Olhoft, M.S.

North Dakota State University

Research Interests: Education, General Agriculture, Agricultural Mechanics, Leadership, Youth Organizations

Scott W. Pryor, Ph.D.

Cornell University, 2005

Research Interests: Biorenewable Products and Bioprocessing

Shafiqur Rahman, Ph.D.

University of Manitoba, 2004

Research Interests: Livestock Waste Management. Water Quality and Air Quality Assessment and Mitigation, Dust and Particulate Matter Emission

Thomas S. Scherer, Ph.D.

University of Minnesota, 1986

Research Interests: Soil and Water Resources Management, Irrigation Systems

Halis Simsek, Ph.D.

North Dakota State University, 2012

Research Interests: Water and Wastewater Treatment, Animal and Agricultural Waste Management

Dean D. Steele, Ph.D.

University of Minnesota, 1991

Research Interests: Irrigation and Environmental Engineering

Xin (Rex) Sun, Ph.D.

Nanjing Agricultural University, 2013

Research Interests: Precision Agriculture, Artificial Intelligence in Food and Agriculture, Precision Livestock Production, Meat Quality Non-destructive Detection Methods

Zhao Zhang, Ph.D.

Pennsylvania State University, 2015

Research Interests: Sensing and Automation in Agricultural and Precision Agriculture

Agricultural Education

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Program Coordinator:**
Adam Marx, Ph.D.
- **Department Location:**
School of Education, FLC 210
- **Department Phone:**
(701) 231-7921

- **Application Deadline:**
March 15 for summer and fall admission; October 15 for spring admission.
- **Credential Offered:**
M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

The Master's degree program in Agricultural Education is most ideally suited for current school-based agricultural educators. However, the degree program is modular enough to meet the needs of students seeking advancement and expertise in multiple disciplines. Core coursework will prepare students to evaluate educational programs which they currently or intend to lead with a blended focus on adolescent and adult educational development. Further, coursework extends principles of bachelorette teacher preparation in agriculture. Foundational coursework in research and evaluation methods are taught in a practical and applied manner.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Candidates should work closely with an adviser.

The NDSU programs in education are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Options with Great Plains Ag*Idea

Agricultural Education

- <https://www.gpidea.org/program/agricultural-education> (<https://www.gpidea.org/program/agricultural-education/>)
- May have a focus on the secondary classroom, post-secondary environments, Extension, leadership, or agricultural communications

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (<http://www.nbpts.org>), as well as reasons for applying to the program.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. If a program has a cohort group with enrollment limitations, an entrance interview will be required.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

NOTE: The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure must provide evidence of the required number of years of teaching or counseling, and, in the case of school administration, administrative experience. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Code	Title	Credits
Agricultural Education - MEd MEd Degree Plan A		
Core Courses		12
EDUC 750	Reflective Practice and Research in Education	
EDUC 751	Students and Their Learning	
EDUC 752	Curriculum Design and Delivery	
EDUC 753	Managing/ and Monitoring Learning	

Major/Concentration		12
EDUC 702	Statistics In Educational Research	3
Choose from the following:		
H&CE 724	Program Development In Vocational Education	
H&CE 740	Vocational Philosophy and Policy	
H&CE 743	Experiential and Learner-Centered Instruction	
H&CE 756	Program Development and Evaluation	
H&CE 781	Professional Development in Agricultural Education	
H&CE 787	Issues In Education	
H&CE 795	Field Experience	
Electives (as approved by adviser)		
H&CE 794	Practicum/Internship	3
Total Credits (MEd Degree Plan A Minimum)		30
Agricultural Education - Teacher Licensure Option (TLO) MEd. Degree Plan B. For those seeking initial teacher licensure. Candidates will have earned a Bachelor's degree in an agriculture or closely related area. Candidates must meet all requirements of related TLO program: www.ndsu.edu/ted/graduate/teacher_licensure_option/		
H&CE 232	Philosophy and Policy (CTE Licensure Requirement, Not MEd degree eligible)	3
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 661	Introduction to Special Education	3
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
EDUC 724	Advanced Educational Psychology	3
H&CE 644	(Forthcoming Proposal - H&CE 444 currently)	3
H&CE 680	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education (Forthcoming Proposal - H&CE 480 currently)	3
H&CE 681P	Methods of Teaching Agriculture	3
H&CE 683P	Student Teaching Seminar	1
H&CE 687P	Student Teaching	9
H&CE 688P	Applied Student Teaching	3
Total Credits (MEd TLO Option B)		37
DSU/NDSDU Dual Degree Collaborative Agricultural Education - Teacher Licensure Option MEd Degree Plan C. Ag Ed TLO Degree in Collaboration with Dickinson State University		
Refer to DSU/NDSDU Degree Plan for BS Credit requirements. Students must be enrolled at Dickinson State University at the time of application to the Collaborative Ag Ed TLO program.		
H&CE 646	Extension Education ^{Optional}	2
H&CE 644	(Forthcoming Proposal - H&CE 444 currently)	3
H&CE 680	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education (Forthcoming Proposal - H&CE 480 currently)	3
H&CE 681P	Methods of Teaching Agriculture	3
EDUC 651P	Instructional Planning, Methods and Assessment	3
EDUC 661	Introduction to Special Education	3
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
H&CE 683P	Student Teaching Seminar	1
H&CE 687P	Student Teaching	9
H&CE 688P	Applied Student Teaching	3
Total Credits (MEd Option C)		34-36

Adam A. Marx, Ph.D.

University of Missouri, 2014

Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Brooke Thiel, Ph.D.

North Dakota State University, 2020

Research Interests: Career Readiness, 21st Century Skills, Teacher Development

Animal Sciences

Department Information

- **Interim Department Head:**
Marc Bauer, Ph.D.
- **Graduate Coordinator:**
Kendall Swanson, Ph.D.
- **Department Location:**
102 Hultz Hall
- **Department Phone:**
(701) 231-7641
- **Department Web Site:**
www.ag.ndsu.edu/ansc/ (<http://www.ag.ndsu.edu/ansc/>)
- **Application Deadline:**
Applications are accepted for fall, spring and summer semester admits.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Animal Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: animal breeding, animal nutrition, animal genetics, animal health and stewardship, physiology of reproduction, meat and muscle science, and nutritional physiology.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to Animal Sciences programs are fostered.

The Department of Animal Sciences graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School's requirements, to be admitted with full status to the program, an applicant must have adequate preparation in animal sciences or in a complementary area of life sciences and have a background or interest in agriculture.

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research.

The Animal Sciences program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or more.

Each student must choose an adviser, usually based upon area of academic and research interest when starting the program. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Animal Sciences Graduate Student Handbook for information regarding additional requirements.

Candidates for the M.S. normally complete their degree requirements in two years. Candidates for the Ph.D. generally complete their degree requirements in three to four years.

The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Code	Title	Credits
Required Courses		
Didactic Course Work (601-689, 691; 700-789, 791; 800-889, 891)		16
Statistical Courses*		6
STAT 661	Applied Regression Models	
PLSC 724	Field Design I	

ANSC 790	Graduate Seminar	2
ANSC 792	Graduate Teaching Experience (**)	2
ANSC 798	Master's Thesis	6-10
Total Credits		30

* Other NDSU statistical courses or equivalents (transfer credit)

** Required for students receiving assistantships. All graduate students are encouraged to obtain teaching experience each semester.

See information in Graduate Bulletin

Marc L. Bauer, Ph.D.

University of Kentucky, 1996

Research Interests: Nutritional Physiology with emphasis on Nutrient Metabolism and Utilization in Ruminants

Eric P. Berg, Ph.D.

Purdue University, 1996

Research Interests: Influence of Environment, Nutrition, and Genetic Factors as They Impact Meat-Animal Production Efficiency, Health, Carcass Composition, and Meat Quality

Erika Berg, Ph.D.

University of Missouri, 2006

Research Interests: The Impact of Therapeutic Horsemanship on Human and Equine Participants. Maternal and Environmental Influence on Equine Neonatal Physiology

David Buchanan, Ph.D.

University of Nebraska

Research Interests: Animal Breeding and Genetics

Chris Byrd, Ph.D.

Purdue University, 2018

Research: Applied Ethology and Stress Physiology

Kasey Maddock Carlin, Ph.D.

Iowa State University, 2005

Research Interests: Meat Science with emphasis on Physiological and Biochemical Changes in Muscle Postmortem on Meat Quality

Joel S. Caton, Ph.D.

New Mexico State University, 1987

Research Interests: Ruminant Nutrition with emphasis on Nutrition and Reproduction interactions, Forage Utilization, Digestive Physiology and Selenium Metabolism

Carl Dahlen, Ph.D.

University of Minnesota, 2009

Research Interests: Beef Cattle Production

Carolyn Hammer, DVM, Ph.D.

Iowa State University, 2003

Research Interests: Equine Preventative Medicine, Growth and Development, Immunology

Lauren Hanna, Ph.D.

Texas A & M University, 2013

Research Interest: Animal Genetics; Genomics

Travis Hoffman, Ph.D.

Colorado State University, 2015

Research Interest: Sheep Production, Lamb Quality, Sheep and Goat Value, Direct Meat Marketing

Greg Lardy, Ph.D.

University of Nebraska, 1997

Research Interests: Cow-Calf Nutrition, By-Product Utilization, Range Nutrition

Rob Maddock, Ph.D.

Texas A&M University, 2000

Research Interests: Factors Affecting Beef Quality and Value, Consumer Acceptance of Meat Products

Miranda Meehan, Ph.D.

North Dakota State University, 2012

Research Interests: Riparian Ecology and Management, Livestock and Wildlife Interactions, Impacts of Energy Development on Livestock Production

Lawrence P. Reynolds, Ph.D.

Iowa State University, 1983

Research Interests: Maternal and Placental Physiology During Pregnancy in Livestock Including Cellular and Molecular Aspects

Gerald Stokka, DVM, M.S.

Iowa State University, 1982

Research Interest: Immunology; Preventive Medicine; Animal Stewardship-well-being

Kendall Swanson, Ph.D.

University of Kentucky, 2001

Research Interests: Ruminant Nutrition

Alison Ward, Ph.D.

University of Saskatchewan, 2011

Research Interests: Nutritional and Genetic Interactions; Epigenetics, Especially In Regards to Maternal Nutrition and Fetal Programming

In addition to the above listed faculty, there are numerous adjunct faculty members who participate in the graduate program.

Anthropology

Department Information

- **Department Chair:**
Chris Whitsel, Ph.D.
- **Graduate Coordinator:**
Kristen Fellows, Ph.D.
- **Department Location:**
Minard 428
- **Department Phone:**
(701) 231-8657
- **Department Email:**
ndsu.anthropology@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/socanth (<http://www.ndsu.edu/socanth/>)
- **Application Deadline:**
For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Credential Offered:**
M.A., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7

Program Description

The Department of Sociology and Anthropology offers an M.S. and M.A. degree in Anthropology. The program centers on human heritage past, present and future, both cultural and material, and it is based on the principle that graduate level education in Anthropology is a desirable preparation for a growing number of career orientations. The precise plan of study for each student is established in consultation with the academic adviser. Graduate students are also expected to enhance their course work and degree research by engaging in professional development activities such as paper or poster presentations and/or attendance at academic conferences, campus and community service, and teaching and research assistantships. Sample positions that our graduates have obtained include university and college teaching, contract archaeology, folklore program coordination, international studies administration, National Park Service archaeology, not-for-profit program event coordination management, teaching English in other countries abroad, and research analysis as cultural experts.

The focus of graduate education in Anthropology is directed toward both the development of applied anthropologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general anthropology. Areas of specialization include cultural anthropology and archeology.

The Anthropology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to anthropological theory and a variety of research methods. Research facilities include the Archaeology Technologies Laboratory and Anthropology Materials Laboratory.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field or internship experience. Students electing this option are required to complete a comprehensive study paper related to their experience, such as evaluating a program.

Students in the Anthropology graduate program benefit from a favorable faculty-to-student ratio.

The Anthropology graduate program is open to qualified graduates from universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's requirements and have adequate preparation in anthropology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

The masters degree (M.A. or M.S.) in Anthropology credit requirements consists of a minimum 30 credits (for the thesis option) with 16 didactic credits or 35 credits (for the paper and exam options) with 21 didactic. Core requirements include the following:

- Successfully complete a theory-oriented Anthropology course (such as ANTH 680 (<https://bulletin.ndsu.edu/search/?P=ANTH%20680>) Development of Anthropological Theory)
- Successfully complete a methods-oriented Anthropology course (such as ANTH 681 (<https://bulletin.ndsu.edu/search/?P=ANTH%20681>) Ethnographic Research Methods)
- Complete additional coursework to finish the 30-credit requirement (24 for thesis, 26 for paper)
- Complete a research-based thesis, a comprehensive study paper, or a comprehensive exam and pass an oral defense of the thesis, paper, or exam administered by the student's supervisory committee.

John L. Creese, Ph.D.

University of Toronto, 2011

Research Interests: Archaeology, Spatial Analysis, Household and Settlement Archaeology, Material Culture, Theory, North America and Great Lakes

Kristen R. Fellows, Ph.D.

University of Pennsylvania, 2013

Research Interests: Anthropological Archaeology, Historical Archaeology, Ethnohistory, African Diaspora, Archaeology of Plantations; Colonial Encounters; Globalization and Transnationalism; Feminist Archaeology, the Caribbean; North America

Ellen B. Rubinstein, Ph.D.

Yale University, 2012

Research interests: Medical and Psychological Anthropology, Diagnosis, Disability, Care, Aging, Family, U.S. Primary Care, Cancer Survivorship, Japan

Architecture

Department Information

- **Interim Department Chair:**
Michael J. Strand, M.F.A.
- **Graduate Coordinator:**
Cindy Urness
- **Department Location:**
Renaissance Hall
- **Department Phone:**
(701) 231-6151
- **Department Web Site:**
ala.ndsu.edu/ (<http://ala.ndsu.edu/>)
- **Application Deadline:**
February 1 for fall semester, portfolio required
- **Credential Offered:**
Master of Architecture (M.Arch.)

- **English Proficiency Requirements:**
TOEFL iBT 80; IELTS 6.5

Program Description

NDSU offers a 5-year NAAB accredited, first-professional Master of Architecture degree program housed primarily in a beautifully-restored historic industrial building in downtown Fargo, which has emerged as an exciting, student-oriented urban district. Most students entering the graduate program in architecture come directly from the NDSU pre-professional Bachelor of Science in Architecture program. The curriculum includes field trips to cities across the country and is supported by a professionally-staffed wood shop, digital media labs, and laser cutters and 3D printing for model-making. Both traditional and digital media are emphasized. An optional semester abroad, plus foreign study tours during summers are offered.

In the United States, most registration boards require a degree from an accredited professional degree program as a prerequisite for licensure.

The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit professional degree programs in architecture offered by institutions with U.S. regional accreditation, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted an eight-year, three-year, or two-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may require a pre-professional undergraduate degree in architecture for admission. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

North Dakota State University's Architecture program offers the following NAAB-accredited degree program:

- M.Arch. (pre-professional degree + 30 graduate credits)
- Next accreditation visit: 2026

Admission Requirements

- Students currently enrolled in the 4-year pre-professional degree at NDSU may apply to the Master of Architecture program. Transfer students with pre-professional or professional degrees in architecture from another school may be considered for admission to years 4 and 5 in the program, based on test scores, GPA, and portfolio review. Transfer students should contact the department directly before application to the Graduate School.
- Candidates must have earned a cumulative grade point average of 3.0 to be considered for full graduate standing

Curriculum

Click here for the latest information on the Curriculum (http://www.ndsu.edu/ala/architecture/Degree_curriculum.php).

Click here for course descriptions. (p. 1109)

Bakr Mourad AlyAhmed, Ph.D.

Virginia Tech, 2002

Creative/Research Interests: Beach Resort Design, Sustainable Design Modeling, Eco-Tourism Development, Building Capacity Measures, Advanced Environmental Planning

Mark Barnhouse, M.Arch.

Pratt Institute, 1988

Creative/Research Interests: Water Resources and the Built Environment, and the Graphic Interpretation of Parametric Data about the Built Environment

David Bertolini, Ph.D.

Temple University, 2007

Creative/Research Interests: Architecture and Film Theory, Ideology and Aesthetics

Darryl Booker, M.Arch.

University of Colorado, 1980

Creative/Research Interests: Design Education, Design Process, Quantum Thinking, Ecology and Architecture

Michael Christenson, M.Arch., AIA

University of Minnesota, 1997

Creative/Research Interests: Architectural Epistemology, Commonalities between Architectural Analysis and Design; Iterative Processes; Parametric Modeling.

David A. Crutchfield, M.Arch., AIA

University of Texas at Austin, 2004

Creative/Research Interests: Theoretical inquiry into architecture as the interrelation of Nature, Culture, and Aesthetics; Innovation, Analysis, and Critical Evaluation of Eco-social Design; Sustainable Design in professional practice

Don C. Faulkner, M.Arch.

University of Utah, 1975

Creative/Research Interests: Urban Design, Building Community and Public Engagement

Dominic L. Fischer, MLA, PLA

City College of New York, 2011

Creative/Research Interests: Landscape Architecture History, Environmental Planning, Urban Design, Small Urban Spaces, Historic Preservation

Heather L. Fischer, MDS-HP

Boston Architectural College, 2014

Creative/Research Interests: Architectural Drawing; Environmental Design/Planning; Historic Preservation; Public Policies; Rural/Cultural Landscapes, and Planning

Paul H. Gleye, Ph.D.

University of California Los Angeles, 1983

Creative/Research Interests: Place-making, Historic Preservation, City Centers

Charlott Greub, M.Arch.

Kunstakademie Düsseldorf, 1992

Creative/Research Interests: Art, Urban Planning, and Design

Matthew Kirkwood, BLA, MDesS, PLA and AZA

Harvard University, 1993

Creative/Research Interests: Landscape Architecture, Environmental Planning, Landscape Ecology, Construction Management and Professional Practice

Ganapathy Mahalingam, Ph.D.

University of Florida, 1995

Creative/Research Interests: Computer-Aided Architectural Design, Architectural Acoustics, Computational Modeling of Design, Interdisciplinary Research, Architectural Philosophy and the Architectural Genome Project

Kathleen Pepple, MFA, MCRP

University of North Dakota, 1981;

North Dakota State University, 1991

Creative/Research Interests: Interstices-Landscape to Architecture, wetland to forest, actual to created image/photography and painting

Ronald H.L.M. Ramsay, M.Arch.

University of Texas at Austin, 1992

Creative/Research Interests: Architectural History, Historic Preservation, the Progressive Era, Planning History, Professionalization, Faith and Form

Regin Schwaen, M.A.A.

City Building, Arkitektskolen i Aarhus, 1992

Creative/Research Interests: Urban Buildings, Conceptual Models, Minimal Concrete Structures, Visual Communication

Malini Srivastava, M.Arch.

University of Minnesota, 1998

Creative/Research Interests: Gaming and Architecture, Responsive building skins material experimentation, High-performance design (energy modeling), Raster- and vector-mapping to inform next generation community actions

Cindy Urness, M.Arch.

Pratt Institute, 1988

Creative/Research Interests: Building Technology, Urban Design, Utopian Cities, Sustainable Design, Universal Design, Student Success

Stephen Wischer, M.Arch., MFA

University of Calgary, 2004

Creative/Research Interests: History/Theory, Existential Philosophy, Interdisciplinary Relationships, Art, Embodied Artifacts, Process, Experience and Poetics

Athletic Training

Department Information

- **Department Head:**
Yeong Rhee, Ph.D.
- **Program Coordinator:**
Shannon David, Ph.D.
- **Department Location:**
Bentson Bunker Fieldhouse
- **Department Phone:**
(701) 231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/athletic_training_professional/ (http://www.ndsu.edu/hnes/athletic_training_professional/)
- **Application Deadline:**
Application review begins December 1 and continues until spots are filled.
- **Credential Offered:**
MATrg
- **English Proficiency Requirements:**
TOEFL iBT 100; IELTS 7; PTE Academic 68

Program Description

The Master of Athletic Training (MATrg) is a professional program accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The MATrg program prepares students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity. This is a five-semester program starting in the summer term.

Option 1: Five-Year Program. This unique option allows the student to complete a Bachelor of Science in Exercise Science and Master of Athletic Training (MATrg) degree in five years.

- During years 1-3 students follow the NDSU Exercise Science guidelines and curriculum**.
- Students apply to the MATrg program through the NDSU Graduate School during the third year (typically Junior standing).
- Accepted students begin the MATrg program in the summer.
- During year 4 students complete both Exercise Science **and** MATrg courses. The Exercise Science degree is awarded in August.
- During year 5 students complete MATrg courses. Upon successful completion of all program and Graduate School requirements, the MATrg degree is awarded in May.

** Transfer students and students who change majors must follow the Exercise Science policies and curriculum. This may extend the time line for program completion.

Option 2: Two-Year Program. Students who have a conferred Bachelor's degree in a related field will follow Option 2.

- Students apply to the MATrg program through the NDSU Graduate School.
- Accepted students begin the program in the summer.
- Years 1 and 2 students follow the MATrg Plan of Study for Option 2
- Upon successful completion of all program and Graduate School requirements, the MATrg degree is awarded in May.

Requirements for 2020-2021 Admission

Program Website: https://www.ndsu.edu/hnes/athletic_training_professional/

1. Overall GPA of 3.0 at the time of application (3.0 GPA or higher maintained to start of program)
2. The following courses must be completed with a letter grade of "C" or better earned and documented on official transcripts prior to the start of the program in Summer 2021.
 - Human Anatomy and Lab 1 semester
 - Human Physiology and Lab 1 semester

- General Physics and Lab 1 semester
- General Chemistry and Lab 1 semester
- Biomechanics and/or Kinesiology 1 semester
- Exercise Physiology 1 semester
- Medical Terminology 1 semester
- Nutrition 1 semester
- Psychology 1 semester

3. Statement of Purpose: Please include the following information in your statement:
 - a. Reasons why you are pursuing graduate studies at NDSU
 - b. Explain your interest in pursuing a career in Athletic Training
 - c. Background preparation for Athletic Training
 - d. Relevant skills and experiences you have acquired
4. Research Writing: Students are required to write a research-based position paper explaining why research is important in Athletic Training and how it is relevant to clinical practice. Minimum of two references of support. Three-page maximum.
5. Three (3) letters of recommendation – at least one letter must be from an instructor/professor. They must testify to integrity (i.e. professionalism, communication skills, work ethic) of the student.
6. Documentation of a minimum of 50 hours of observation completed under the direct supervision of a BOC ATC® in an athletic training room setting. 50 hours must be completed within one (1) calendar year of application. Form can be found on MATrg website. Submit signed form under supplemental materials.
7. Documentation of current CPR Training in one of the following:
 - a. American Heart Association: BLS Healthcare Provider/BLS Provide
 - b. American Red Cross: CPR/AED for the Professional Rescuer
 - c. American Red Cross: Basic Life Support of Healthcare Providers

Submit copy of certificate under supplemental materials.

8. International students must meet the following English Language Test score requirements for HNES Graduate Programs:

TOEFL (pbt): 600 TOEFL (ibt): 100 IELTS: 7 Academic PTE: 68

Application Process

1. Apply online through ATCAS: <https://atcas.liaisoncas.com/applicant-ux/#/login>.
2. After creating your account, select the NDSU MATrg. program.
3. Follow steps to pay the \$35 NDSU application fee.

Application submission does not constitute acceptance into the program nor is acceptance guaranteed simply upon completion of requirements. Only completed applications will be reviewed. Admission requirements are weighted. Overall GPA and interview performance carry the major percentage of the weighting process. Exceptions to the requirements can be made on recommendation by the MATrg Application Committee.

Admission Acceptance/Denial into the MATrg:

The MATrg application process is a competitive process. A committee reviews completed graduate school applications and selects applicants to interview. The committee will set up a time with the student to complete the interview process (web-based or in person). Students will be notified by the NDSU Graduate School regarding formal MATrg program status. All NDSU Graduate School Policies will be followed accordingly.

Code	Title	Credits
Summer I		
HNES 780	Athletic Training Techniques	3
Fall I		
HNES 770	Evidence Based Research and Practice	2
HNES 781	Orthopedic Assessment I	4
HNES 794	Practicum/Internship	2
Spring I		
HNES 775	Therapeutic Modalities	3
HNES 782	Orthopedic Assessment II	5
HNES 794	Practicum/Internship	2
Summer II		
HNES 720	Advanced Emergency Care	3

Fall II		
HNES 772	Prevention and Health Promotion in Athletic Training	2
HNES 774	Therapeutic Exercise	3
HNES 776	Non-Orthopedic Assessment	2
HNES 794	Practicum/Internship	3
Spring II		
HNES 773	Athletic Training Capstone	2
HNES 778	Athletic Training Administration and Professional Development	3
HNES 794	Practicum/Internship	3
Total Credits		42

Shannon David, Ph.D., ATC

Ohio University, 2013

Contemporary Expertise: Patient-Clinician Relationship, Research Methods and Design, Professional Issue

Katie Lyman, Ph.D., ATC

University of South Florida, 2014

Contemporary Expertise: Kinesio Tape®, EMG, Emergency Medicine

Biochemistry

Department Information

- **Department Chair:**
Gregory Cook, Ph.D.
- **Graduate Admissions Director:**
Sangita Sinha, Ph.D.
- **Department Location:**
Ladd Hall
- **Department Phone:**
(701) 231-8694
- **Department Web Site:**
www.ndsu.edu/chemistry (<http://www.ndsu.edu/chemistry/>)
- **Application Deadline:**
April 15 for fall, October 31 for spring. Spring admissions depend on the availability of fellowships and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE (general and subject recommended, but not required)
- **English Proficiency Requirements:**
TOEFL iBT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers graduate study leading to the M.S. and Ph.D. degrees. The department also participates in the interdisciplinary Ph.D. program in Cellular and Molecular Biology.

At the start of the first year of study, entering graduate students take entrance examinations in chemistry and biochemistry, as well as analytical, inorganic, organic, and physical chemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student.

The chemistry, biochemistry, and molecular biology of plant, animal, insect, and microbial systems are studied through advanced course work and research. Selection of the area of emphasis depends on the interests of the student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged \$1.8 million over the last 10 years, with more than \$2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The recently upgraded facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2-D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography facilities, including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a Kevex X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (<http://www.ndsu.edu/chemistry/>) for the latest descriptions of research programs and instrumentation.

The graduate programs in biochemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry and biochemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is \$22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work. The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790 or BIOC 790	Graduate Seminar (second year seminar) Graduate Seminar	1

UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Candidates for the PhD degree are required to earn at least 90 semester credits, which can include credits for seminar and research. No fewer than 27 of these 90 semester credits shall be earned in courses carrying graduate credit (courses numbered 601 to 789), and of these 27 credits, a minimum of 20 must be from courses numbered 701 to 789. Of these 20 credits, the requirement is 8 total credits in at least two fields of study other than the major area, selected from:

- Analytical Chemistry
- Biochemistry & Molecular Biology
- Coatings and Polymeric Materials
- Inorganic Chemistry
- Materials & Nanotechnology
- Microbiology

- Organic Chemistry
- Physical Chemistry
- Other related area (e.g., Physics, Math, Pharmacy, Engineering, Zoology)

A student matriculating with a Master's Degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. Of these credits, not fewer than 15 credits must be NDSU courses numbered from 701 to 789. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of C&B 625, 626, 627, 628 and 630.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	
BIOC 790	Graduate Seminar (second year seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (proposal seminar)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (public presentation)	
or CHEM 790	Graduate Seminar	
BIOC 790	Graduate Seminar (defense seminar)	
or CHEM 790	Graduate Seminar	
UNIV 720	Scientific Integrity	

As part of total semester credits, the following departmental courses are required for students based on program:

CHEM 725	Advanced Survey of Inorganic Chemistry
BIOC 673	Methods of Biochemical Research
BIOC 674	Methods of Recombinant DNA Technology
BIOC 701	Comprehensive Biochemistry I
BIOC 702	Comprehensive Biochemistry II
CHEM 732	Advanced Survey of Analytical Chemistry
CHEM 741	Physical Organic Chemistry I
CHEM 759	Advanced Survey of Physical Chemistry
BIOC 899	Doctoral Dissertation

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements: 1) satisfactory performance in course work with a minimum 3.0 grade-point average, 2) satisfactory performance on a written comprehensive examination, taken by the end of the fourth semester, and 3) satisfactory defense of an original research proposal on a topic approved by the student's advisory committee. The defense of this proposal must occur at least eight months prior to the final oral examination.

Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Christopher L. Colbert, Ph.D.

Purdue University, 2000

Postdoctoral, Howard Hughes Medical Institute, 2000-2004

Research Interests: Structural Biology and Metalloprotein Biochemistry

Heldur Hakk, Ph.D. (adjunct)

North Dakota State University, 1997

Research Interests: Fate and Metabolism of Environmental Contaminants

Stuart J. Haring, Ph.D.

University of Iowa, 2004

Postdoctoral, University of Iowa, 2004-2008

Research Interests: DNA Metabolism and Cell Cycle Regulation

Sangita C. Sinha, Ph.D.

Purdue University, 2000

Postdoctoral, Howard Hughes Medical Institute, 2001-2005

Research Interests: Biochemistry and Structural Biology of Host-Pathogen Interaction

D. K. Srivastava, Ph.D.

Banaras Hindu University, 1980
Research Interests: Mechanistic Enzymology

John Wilkinson, Ph.D.
Vanderbilt University, 2001
Postdoctoral, University of Michigan, 2001-2006
Research Interests: Metabolic Control of Cancer Progression

Biological Sciences

Department Information

- **Department Chair:**
Kendra J. Greenlee, Ph.D.
- **Graduate Coordinator:**
Steve Travers, Ph.D.
- **Department Location:**
201 Stevens Hall
- **Department Phone:**
(701) 231-7087
- **Department Email:**
ndsu.biological.sciences@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/biology/ (<http://www.ndsu.edu/biology/>)
- **Application Deadline:**
Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5

*Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. For e-mail addresses of faculty members and additional information about our programs, please visit our web site at <http://www.ndsu.edu/biology/>.

Program Description

The Department of Biological Sciences offers graduate study leading to Master of Science and Doctor of Philosophy degrees. Master of Science degrees are available in Biology and Environmental and Conservation Sciences.

Doctor of Philosophy degrees are available in Biological Sciences, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, and STEM Education. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, biology education research, cell biology, comparative biochemistry and physiology, cancer biology, conservation biology, ecology, endocrinology, developmental biology, evolution, fisheries biology, molecular biology, plant biology, population biology, prairie pothole ecology, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research. The NDSU Library has extensive holdings of journals, monographs, books, and other reference materials covering various fields in biology. The library offers full access to online catalogs and databases.

Faculty in the department have research programs ranging from molecular biology to ecosystem ecology and work with a wide variety of organisms across multiple levels of organization, from cellular mechanisms to ecosystem function. Modern equipment is available for conducting research in cell and molecular biology and field ecology and behavior. The department has access to a vascular plant herbarium with 240,000 specimens emphasizing Northern Great Plains flora, a lichen herbarium consisting of about 15,000 specimens with a worldwide representation of taxa, and a vertebrate collection with approximately 10,000 specimens.

The department offers access to a range of equipment and facilities necessary for laboratory research, including greenhouses, animal rooms, growth chambers, tissue culture facilities, ultracentrifuges, spectrophotometers, electrophoresis, light microscopes, gas chromatography, GC-mass

spectrometry, and high performance liquid chromatography. Facilities are available for protein and DNA sequencing, oligonucleotide synthesis, interactive laser cytometry, scanning transmission and electron microscopy, and confocal microscopy.

The graduate programs in the Department of Biological Sciences are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet all Graduate School admission requirements.

Applications should be submitted directly to the Graduate School. For full consideration for GTA or GRA positions, applications must be submitted by January 15. Applicants will not be considered without a department faculty member who has agreed to serve as the major adviser. Correspondence with one or more departmental faculty members before and during the application process is essential. For email addresses for faculty members and for additional information about our programs, please visit our website at www.ndsu.edu/biology/ (<https://www.ndsu.edu/biology/>).

Financial Assistance

Research assistantships and teaching assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, as well as financial need.

A student must first be accepted by the Graduate School before consideration for financial assistance. Assistantships include a waiver of tuition.

In addition to research and teaching assistantships, there are other types of financial support. A limited number fellowships are available through the Graduate School. Outstanding scholarship and financial need are primary considerations for these fellowships. Scholarships in specific areas are also available through the Department of Biological Sciences. These are generally supplemental and do not include tuition waivers. Students are considered for these awards after enrollment, with primary considerations being scholastic performance and research at NDSU.

Students must select a major adviser prior to their arrival for graduate studies.

The Master of Science program generally requires a minimum of 24 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. The Master of Science degree may be earned by either of two options. The thesis option emphasizes completion of a research project. The comprehensive study option requires more course work, and instead of conducting research and presenting a thesis, the candidate presents a paper or papers approved by the adviser to the examining committee, demonstrating ability for scholarly study and written expression. Candidates under both options must present a seminar on the thesis research or comprehensive study, and must pass an oral examination.

Code	Title	Credits
Master of Science (M.S.)		30
Basic Research Principles		
BIOL 790	Graduate Seminar	
UNIV 720	Scientific Integrity (or equivalent as approved by committee)	
BIOL 842	Quantitative Biology (or equivalent as approved by committee)	
Biological Content Courses to be approved by the advisory committee.		
BIOL 798	Master's Thesis	

The Ph.D. program generally requires a minimum of 36 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed to academic subject matter and a final defense of the dissertation.

Code	Title	Credits
Ph.D. Program		90
BIOL 790	Graduate Seminar	
BIOL 842	Quantitative Biology (or equivalent as approved by committee)	
BIOL 884	Biological Research Principles	
Biological Content Courses to be approved by the advisory committee		
UNIV 720	Scientific Integrity (or equivalent as approved by committee)	
ZOO 899	Doctoral Dissertation	

Laura Aldrich-Wolfe, Ph.D.

Cornell University, 2006

Research Interests: Community ecology, mycorrhiza and plant-fungal interactions

Julia H. Bowsher, Ph.D.

Duke University, 2007

Research Interests: Evolutionary and Developmental Biology of Insects

Ned A. Dochtermann, Ph.D.

University of Nevada, 2009

Research Interests: Evolutionary and Behavioral Ecology

Erin H. Gillam, Ph.D.

University of Tennessee-Knoxville, 2007

Research Interests: Evolution and Behavioral Function of Communication Signals Using Bats as a Model

Kendra J. Greenlee, Ph.D.

Arizona State University, 2004

Research Interests: Comparative Physiology, Insect Respiration and Immunology

Timothy J. Greives, Ph.D.

Indiana University, 2009

Research Interests: Hormones and Behavior, Seasonality, Biological Rhythms, Reproductive Eco-physiology

Jill Hamilton, Ph.D.

University of British Columbia, 2012

Research Interests: Plant Evolutionary Genomics

Britt Heidinger, Ph.D.

Indiana University, 2007

Research Interests: Physiological Ecology, Senescence, Stress Physiology

Angela Hodgson, Ph.D.

University of Minnesota, 2010

Research Interests: Ecosystem Biology and Wildlife Conservation Biology

Jiha Kim, Ph.D.

University of Georgia, 2006

Research interests: Tumor Microenvironment

Jennifer L. Momsen, Ph.D.

Rutgers, 2007

Research Interests: Biology Education at the Undergraduate Level

Lisa M. Montplaisir, Ph.D.

University of Arizona, 2003

Research Interests: Science Education, Teaching and Learning, Curriculum Development

Marinus L. Otte, Ph.D.

Vrije Universiteit, 1991

Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Katie M. Reindl, Ph.D.

North Dakota State University, 2006

Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

Sarah Signor, Ph.D.

University of California-Davis, 2013

Research interests: Insect Evolutionary Genomics

Matthew Smith, Ph.D.

University of Arkansas, 2012

Research Interests: Patterns of Phenotypic Variation in Natural Populations

Craig A. Stockwell, Ph.D.

University of Nevada, 1995

Research Interests: Evolutionary Ecology of Vertebrate Populations, Conservation Biology, Fisheries Biology

Jon Sweetman, Ph.D.

Queen's University, 2006

Research interests: Aquatic Ecology and Environmental Change

Steven E. Travers, Ph.D.

University of California-Santa Barbara, 1998

Research Interests: Plant Evolutionary Ecology

Emeritus

William J. Bleier, Ph.D.

Texas Tech University, 1975

Research Interests: Blackbirds, Animal Depredation, Avian Ecology

Malcolm G. Butler, Ph.D.

University of Michigan, 1980

Research Interests: Aquatic Ecology, Limnology, Fisheries, Water Quality, Wildlife Management

Gary K. Clambey, Ph.D.

Iowa State University, 1975

Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in Midwestern Ecosystems, Human Ecology

Theodore L. Esslinger, Ph.D.

Duke University, 1974

Research Interests: Lichenology; Taxonomy, Chemosystematics, and Floristics of Lichens; Emphasis on the Parmeliaceae and Physciaceae

James W. Grier, Ph.D.

Cornell University, 1975

Research Interests: Eagles and Other Birds of Prey, Herpetology, Aquatic Organisms, Fossils, Animal Population Dynamics, Habitat Ecology

Gary L. Nuechterlein, Ph.D.

University of Minnesota, 1980

Research Interests: Behavioral Ecology of Birds; Wildlife Ecology, Particularly of Nongame Species

Adjunct

Michael J. Anteau, Ph.D.

Louisiana State University, 2006

Mark E. Clark, Ph.D.

University of Tennessee, 1996

Ned H. Euliss, Jr., Ph.D.

Oregon State University, 1989

Mark A. Hanson, Ph.D.

North Dakota State University, 1990

Douglas H. Johnson, Ph.D.

North Dakota State University, 1986

George M. Linz, Ph.D.

North Dakota State University, 1982

Daniel C. McEwen, Ph.D.

North Dakota State University, 2008

David M. Mushet, Ph.D.

North Dakota State University, 2010

Wendy L. Reed, Ph.D.

Iowa State University, 2000

Marsha A. Sovada, Ph.D.

North Dakota State University, 1993

Steve K. Windels, Ph.D.

Michigan Technological University, 2008

Brian Wisenden, Ph.D.

University of Western Ontario, 1993

Biomedical Engineering

Department Information

- **Program Coordinator:**
Annie Tangpong, Ph.D.
- **Email:**
Annie.Tangpong@ndsu.edu
- **Department Location:**
Dolve 111C
- **Department Phone:**
(701) 231-8839
- **Department Web Site:**
www.ndsu.edu/coe/bme/ (<http://www.ndsu.edu/coe/bme/>)
- **Application Deadline:**
February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Credential Offered:**
Ph.D., M.S., on campus and online

Program Description

The graduate-level (M.S. and Ph.D.) programs in Biomedical Engineering (BME) are offered jointly by NDSU's College of Engineering, UND's School of Medicine and Health Sciences, and UND's College of Engineering and Mines.

The BME programs provide opportunities for technically qualified persons to attain specialized knowledge in an area of industry need, and to enhance career opportunities. The objective of the jointly-sponsored, interdisciplinary graduate programs is to:

- Meet the needs of regional students interested in biomedical engineering.
- Attract women and under-represented minorities into a developing field.
- Educate and train students through courses and research focused on biomedical research and device development.
- Advance the biomedical knowledge base through collaborative research directed by faculty from UND's School of Medical and Health Sciences, College of Engineering and Mines, and NDSU's College of Engineering and other qualified researchers from the two universities.
- Through biomedical research and device development, develop intellectual property to generate company spin-offs, attract new companies, and subsequent economic development.

For more information: ndsu.edu/coe/bme/ (<http://engineering.und.edu/bme/>)

Ph.D.:

- a) Bachelor of Science degree from an ABET accredited engineering program
- b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis
- c) Graduate Record Examination General Test for applicants from non-ABET accredited programs
- d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

M.S.:

- a) Bachelor of Science degree from an ABET accredited engineering program.
- b) Students holding a B.S. degree in other disciplines may be admitted to Qualified Status with an obligation to acquire the necessary background undergraduate engineering knowledge. The exact requirements will be determined on a case-by-case basis.
- c) Graduate Record Examination General Test for applicants from non-ABET accredited programs.
- d) Minimum GPA is 3.0 (4.0 scale) is required. Conditional admittance may be obtained for GPA less than 3.0.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels. Applicants should communicate with potential faculty advisors for funding opportunities.

For more information: ndsu.edu/coe/bme/ (<http://engineering.und.edu/bme/>)

Code	Title	Credits
M.S. (30 credits)		
Anatomy & Physiology		3-6
BIOL 660	Animal Physiology	3
BRG Related Courses		6-9
Graduate Preparation (e.g. Grant Writing)		0-3
Internship (industrial, clinical, or research lab):		0-3
Electives (approved by adviser)		9 (max) for thesis option and 15 (max) for non- thesis option
Master's thesis (9) or Master's project (non-thesis option) (3)		
BME 790	Graduate Seminar (One credit per semester.)	3
BME 798	Master's Thesis	9

Code	Title	Credits
Ph.D. (90 credits)		
Anatomy & Physiology		3-6
BIOL 660	Animal Physiology	3
BME 790	Graduate Seminar (One credit per semester)	3-6
or UND-ENGR 562 Seminar (1 credit), or UND-EE 570 Seminar (1 credit)		
BRG Related Courses		12-15
BME 899	Doctoral Dissertation	6-30
Graduate Preparation (e.g. Grant Writing; College Teaching Certificate)		3-6
Internship (industrial, clinical, or research lab):		3-6
Electives (approved by adviser)		36 (max)

For more information: ndsu.edu/coe/bme/ (<http://engineering.und.edu/bme/>)

Business Administration

Department Information

- **Program Director:**
Derek Lehmberg, Ph.D.
- **Email:**
derek.lehmberg@ndsu.edu
- **Program Coordinator:**
Elizabeth Worth, MEd
- **Email:**
elizabeth.worth@ndsu.edu

- **Department Location:**
Barry Hall
- **Department Phone:**
(701) 231-6038
- **Department Web Site:**
www.ndsu.edu/mba (<http://www.ndsu.edu/mba/>)
- **Application Deadline:**
Applications are reviewed on a rolling admission basis for the intended or next available term.
- **Credential Offered:**
M.B.A.
- **Test Requirement:**
GMAT or GRE**
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Master of Business Administration program at North Dakota State University is a non-thesis, professional program structured to serve qualified students with undergraduate degrees in various fields. The program is designed to provide the student with an effective set of analytical skills, a broad view of the way organizations work, and an understanding of the functional areas of business. The NDSU program takes a generalist approach to graduate business education while providing a variety of MBA electives in areas including business analytics, digital marketing and innovation, investments and applied portfolio management, and leadership and managerial skills.

NDSU business faculty use a variety of teaching methods: case studies, group and individual projects, field research, computer applications, guest lecturers, student presentations, and discussion. Class interaction provides rich opportunity to network with professionals from a wide range of industries and countries. The student is able to acquire and improve problem-solving, teamwork, and communication skills and to apply these skills in business situations.

Financial Assistance

The College of Business offers financial assistance through a limited number of graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis to be considered for either an assistantship or scholarship. Assistantships include a stipend and tuition waiver for NDSU's base graduate tuition in return for work within the college. The tuition waiver is limited to graduate course work. Awards are based on academic excellence as determined by grade point average, and high potential as measured by the GMAT score.

GMAT/GRE**

Individuals seeking admission to the MBA program may request a waiver of the GMAT/GRE requirement if they meet one of the following requirements:

- The applicant holds a terminal degree (e.g., PhD, MD, JD, etc.).
- The applicant has a minimum of five (5) years of recent, post-bachelor's, full-time, professional work experience, including managerial responsibilities.

Appropriate documentation (i.e. official transcript, resume) is required to be uploaded to the application file. It does not, however, guarantee a waiver. Applicants are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the MBA program coordinator and/or director.

The total course requirements necessary to complete the MBA degree will vary depending on the background of the student. An adequate background in the functional areas of business is necessary for all students.

Foundation course areas include accounting, economics, statistics, management, marketing, and finance. Based on previous course work, some or all of these courses may be waived.

Beyond the foundation course requirements, all students must complete 30 semester hours of graduate work. Graduate courses in the MBA Program include the following eight required 2-credit core courses:

Code	Title	Credits
Core Courses		
MBA 701	Strategic Cost Management	2
MBA 702	Advanced Financial Management	2
MBA 703	Advanced Organizational Behavior	2

MBA 704	Supply Chain and Operations Management	2
MBA 705	Strategic Marketing Management	2
MBA 706	Managing Information Resources	2
MBA 707	Microeconomics for Managers	2
MBA 708	Advanced Strategic Management	2
Elective course options for plan of study:		14
MBA 711	Advanced Investment Analysis	
MBA 712	Advanced Portfolio Management	
MBA 713	Financial Derivatives	
MBA 714	Financial Analysis and Valuation	
MBA 721	Creating and Marketing Innovations	
MBA 722	Marketing Analytics and Customer Intelligence	
MBA 723	Digital Marketing	
MBA 724	Integrated Marketing Communications	
MBA 732	Managerial Leadership: Essential Competencies	
MBA 733	Management Decision Making	
MBA 734	Negotiations and Alternative Dispute Resolution	
MBA 751	Business Analytics Concepts	
MBA 752	Business Analytics Strategy	
MBA 753	Business Analytics Methods	
Total Credits		30

Business Analytics Graduate Certificate

Description

The Business Analytics Graduate Certificate equips working professionals with methodologies and analytical tools needed to analyze data available in modern organizations. Participants will learn to use advanced spreadsheet functionality, dashboard visualization tools, and report generators for descriptive analytics to understand and report on historical data. In addition, participants will use data mining and other advanced methodologies for predictive and prescriptive analytics to understand future trends.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
MBA 722	Marketing Analytics and Customer Intelligence	2

Leadership and Managerial Skills Graduate Certificate

Description

The Leadership and Managerial Skills Graduate Certificate is designed to help participants improve their skills relating to decision making, communicating, negotiating, working in teams, and leading. In addition to learning theoretical aspects of these areas, the courses in the certificate also provide opportunities for students to improve their “soft skills” relating to working with other people and organizations.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 731	Leading and Managing Teams	2
MBA 732	Managerial Leadership: Essential Competencies	2

MBA 733	Management Decision Making	2
MBA 734	Negotiations and Alternative Dispute Resolution	2

Digital Marketing and Innovation Graduate Certificate

Description

The Digital Marketing and Innovation Graduate Certificate advances participants' knowledge and skill in areas such as marketing strategy, communication, and customer intelligence. Students learn about such topics as new product development, strategy analysis, search engine optimization, marketing analytics, integrated marketing communications, various media vehicles, and much more.

Curriculum

The certificate requires 8 credits of study, comprised of the following four courses.

Code	Title	Credits
MBA 721	Creating and Marketing Innovations	2
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 724	Integrated Marketing Communications	2

Somnath Banerjee, Ph.D.

University of Central Florida, 2015

Field: Marketing

Scott Beaulier, Ph.D.

George Mason University, 2004

Field: Economics

John Bitzan, Ph.D.

University of Wisconsin-Milwaukee, 1997

Field: Economics

Linlin Chai, Ph.D.

Iowa State University, 2016

Field: Marketing

Jun Chen, Ph.D.

University of North Carolina at Charlotte, 2014

Field: Accounting & Information Systems

James W. Clifton, M.Acc.

University of North Dakota, 1988

Field: Accounting

Thomas D. Dowdell, Ph.D.

Temple University, 2004

Field: Accounting

Rajani Ganesh-Pillai, Ph.D.

University of Central Florida, 2009

Field: Marketing

Yongtao "David" Hong, Ph.D.

Drexel University, 2008

Field: Accounting

Huichi Huang, Ph.D.

Syracuse University, 2012

Field: Accounting

Fariz Huseynov, Ph.D.

University of Memphis, 2009

Field: Finance

Joseph M. Jones, Ph.D.

University of Missouri-Columbia, 1991

Field: Marketing

Derek Lehmborg, Ph.D.

University of Western Ontario, 2010

Field: Strategic Management

Jin Li, Ph.D.

University of Alberta, 2007

Field: Marketing

Joshua Marineau, Ph.D.

University of Kentucky, Lexington, 2012

Field: Organizational Behavior

Supavich Pengnate, Ph.D.

Oklahoma State University, 2013

Field: Management Information Systems

Michael J. Peterson, Ph.D.

The University of Iowa, 2002

Field: Accounting

Tim O. Peterson, Ph.D.

Texas A&M University at College Station, 1988

Field: Management/Organizational Behavior

Frederick Riggins, Ph.D.

Carnegie Mellon University, 1994

Field: Management Information Systems

Clay Routledge, Ph.D.

University of Missouri–Columbia, 2005

Field: Management

Charles D. Stevens, Ph.D.

University of Kansas, 1998

Field: Human Resource Management

Joseph G. Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Field: Operations

Chanchai Tangpong, Ph.D.

University of Southern Illinois, 2002

Field: Strategic Management

Ruilin Tian, Ph.D.

Georgia State University, 2008

Field: Finance

Newell Wright, Ph.D.

Virginia Polytechnic Institute, 1993

Field: Marketing

Limin Zhang, Ph.D.

University of Arizona, 2005

Field: Management Information Systems

Wei "David" Zhang, Ph.D.

Syracuse University, 2001

Field: Finance

Jill Zuber, Ph.D.

University of Arkansas, 2007

Field: Accounting

Emeritus

Margaret Andersen, Ph.D.

Indiana University, 1989

Field: Accounting

Bahman Bahrami, Ph.D.

University of Nebraska-Lincoln, 1983

Field: Managerial Economics, Management Information Systems, Labor Relations and Negotiation

William "Bud" Bowlin, Ph.D.

University of Texas at Austin, 1984

Field: Accounting

C. Frederick Eisele, Ph.D.

University of Iowa, 1971

Field: Labor Management and Negotiation

Karen Froelich, Ph.D.

University of Minnesota, 1994

Field: Strategic Management

Bonnie Klammm, Ph.D., CPA

Virginia Commonwealth University-Richmond, 1999

Field: Accounting Information System

Terry W. Knoepfle, J.D., CPA

University of North Dakota, 1981

Field: Business Law and Tax Accounting

Gerry Macintosh, Ph.D.

University of Nebraska-Lincoln, 1992

Field: Sales and Sales Management

Herbert Snyder, Ph.D.

Syracuse University, 1994

Field: Auditing, Forensic Accounting

Rodney D. Traub, Ph.D.

Purdue University, 1994

Field: Operations Management

Business Analytics

Department Information

- **Program Director:**
Fred Riggins, Ph.D.
- **Program Adviser:**
Elizabeth Worth, M.Ed.
- **Email:**
elizabeth.worth@ndsu.edu
- **Department Location:**
200 Barry Hall
- **Department Phone:**
701-231-5845
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/msba/ (<http://www.ndsu.edu/business/programs/graduate/msba/>)
- **Credential Offered:**

M.S.

- **Test Requirement:**
GMAT or GRE

The Master of Science in Business Analytics (MSBA) program at North Dakota State University is a non-thesis, professional program structured to serve qualified students with undergraduate degrees in a variety of fields, although it may be particularly attractive to students with undergraduate degrees in business, computer science, engineering, and statistics. The program is designed to provide students with advanced applied problem solving skills and an understanding of business analytics methodologies and tools mastery. Students get hands-on experience with the most up-to-date tools and methodologies for data management, data modeling, visualization, and data mining.

NDSU business analytics faculty use a variety of teaching methods including case studies, group and individual projects, computer applications, student presentations, and discussion. Many classes take place in the Barry Hall computer labs. The program has a significant capstone experience where students work with local companies analyzing real data and solving real-world problems with data. The program is designated as a STEM program reflecting the technical nature of current data analytics practices.

GMAT/GRE

In addition to the Graduate School application requirements, the GMAT/GRE is required. Individuals seeking admission to the MSBA program may request a waiver of the GMAT/GRE requirement if they meet one of the following requirements:

- The applicant holds a terminal degree (e.g., PhD, MD, JD).
- The applicant has a minimum of five (5) years of recent, post-bachelor's, full-time, professional work experience that is relevant to business analytics and data science.

Appropriate documentation (i.e. official transcript, Statement of Purpose, resume) is required to be uploaded to the application file. It does not, however, guarantee a waiver. Applicants should request the waiver in their Statement of Purpose and provide the rationale for the waiver request. Applicants are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the MBA program coordinator.

MSBA Program Curriculum (30 credits):

Code	Title	Credits
Data Analysis Foundations		6
CSCI 765	Introduction To Database Systems	3
STAT 725	Applied Statistics	3
Business Analytics Foundations		10
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
Business Analytics Advanced Courses		6
MIS 720	Visualization and Reporting	2
MIS 740	Advanced Business Analytics Methods	2
MIS 790	Graduate Seminar	2
Business Analytics Focus and Field Experience		8
Electives - choose from approved list or with advisory's approval		3
MIS 795	Field Experience	5

Somnath Banerjee, Ph.D.

University of Central Florida, 2015
Field: Marketing

James Caton, Ph.D.

George Mason University, 2016
Field: Economics

Linlin Chai, Ph.D.

Iowa State University, 2016
Field: Marketing

Anne Denton, Ph.D.

University of Mainz, 1996
Field: Computer Science

Supavich Pengnate, Ph.D.
Oklahoma State University, 2013
Field: Management Information Systems

Frederick Riggins, Ph.D.
Carnegie Mellon University, 1994
Field: Management Information Systems

Limin Zhang, Ph.D.
University of Arizona, 2005
Field: Management Information Systems

Cellular and Molecular Biology

Department Information

- **Program Coordinator:**
Katie Reindl, Ph.D.
- **Department Web Site:**
www.ndsu.edu/cellularmolecularbiology/ (<http://www.ndsu.edu/cellularmolecularbiology/>)
- **Application Deadline:**
February 15 is the deadline for applicants seeking consideration of financial assistance (fellowship, assistantships) for fall semester and July 1 for spring semester.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE required from any applicants who have not earned a master's degree.
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5, Duolingo 105

Program Description

The CMB program was formed in 1988 and was the first interdisciplinary graduate program at NDSU. The program was designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches.

The CMB program provides cross training of graduate students in the areas of biochemistry and cellular and molecular biology. In this setting, students learn the most up-to-date approaches from a variety of fields. Integration across concepts as well as the application of various approaches to addressing biological problems is developed through their preliminary exam, in which students are required to write a research proposal in the format of a national granting agency and to defend it orally. The students also develop and conduct an original line of research under the supervision of their major adviser. The program also brings together faculty with common interests and who use common approaches and equipment. Such a community of scientists fosters collaboration and engenders a sense of cooperation that leads to shared use of common equipment.

The CMB program prepares students for careers in academia and private industry. All graduates of the program have obtained permanent positions in their field or are engaged in postdoctoral training.

Nearly 40 faculty members in many different departments and representing a variety of colleges participate as faculty mentors. The program is led by the CMB Director, who receives guidance on policy, procedure, and program administration from a multidisciplinary group of faculty who serve on the CMB Steering Committee.

Program Objectives

The CMB program has been designed to respond to the evolving nature of research in the life sciences in which it was recognized that biological phenomena emerge from molecular and cellular events and that the elucidation of such processes increasingly relies on multidisciplinary approaches. In addition, new applications of sensor technology, disease diagnosis and treatment, and other emerging technologies require that scientists work across historical boundaries of their disciplines.

This is a research-oriented degree that requires advanced skills areas of biochemistry, cellular biology, molecular biology, and contemporary research techniques. Prospective students must have a high quantitative aptitude and be prepared to undertake rigorous graduate-level training in research including quantitative methods.

The Cellular and Molecular Biology Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must:

- Hold a baccalaureate degree from an educational institution of recognized standing.
- Have earned a cumulative grade point average (GPA) in all courses of at least 3.0 or equivalent at the baccalaureate level. Applications may be submitted directly to The Graduate School at any time.
- Have adequate preparation and show potential to undertake advanced study and research as evidenced by academic performance and experience.
- If possible, applicants should identify at least one Cellular and Molecular Biology faculty member with whom they wish to study.

A recent score (within 12 months) for the general Graduate Record Examination or successful completion of a relevant M.S. degree is required. No minimum GRE score is required, but investigators may use this as a piece of evidence in consideration of the student's application. Foreign students are required to have proficiency in English as shown by a TOEFL iBT of 71 or higher or an IELTS of 6 or higher, unless they have matriculated from an institution in which instruction is conducted in English.

The following undergraduate courses are required for graduate work in the CMB program:

- **Biology** - One year of general biology with laboratory and one course in genetics are required. Cellular biology or cellular physiology, animal or plant physiology, and microbiology are recommended.
- **Chemistry** - One year of general chemistry with laboratory and two sequential terms of organic chemistry with laboratory are required. Biochemistry is recommended.
- **Mathematics** - Two terms of life sciences calculus are required.
- **Physics** - Two sequential terms of general physics with laboratories (above the concept level) are required.
- **Recommended** - introductory courses in computer science, statistics, and technical writing.
- With program approval, up to 3 courses may be attempted within the first year of resident study to correct deficiencies in required courses. Graduate credit will not be earned for these courses.

Applicant Selection

Applications for the CMB program are accepted on a rolling basis throughout the year; however, for full consideration for a CMB program stipend, application must be made by the deadlines listed for fall admission (July 1). Acceptance into the program is based upon both the quality of the application and the capacity of the program.

As a program that encompasses many departments and core areas of research, as well as being an interdisciplinary training program, it is helpful to potential advisors to know what aspects of research the student is interested in. Students are encouraged to explore potential advisors' work and identify areas of interest that align with one or more CMB faculty research program(s). These areas should be addressed in the applicant's statement of purpose. If an applicant is open to a broad range of research, it is helpful to identify that as well (for example, working with plant genetics, any aspect of infectious disease, aspects of either cancer biology or therapeutics, etc). Students are only admitted to the program if a successful match with a CMB faculty member can be made, so this is a critical aspect of the application demonstrating what the student will bring to the research endeavor.

Participating Departments/Programs

North Dakota State University offers an interdisciplinary program leading to the doctoral degree in Cellular and Molecular Biology. The CMB program is a joint effort of the Colleges of Agriculture, Food Systems, Natural Resources; Science and Math; Health Professions; and Engineering and includes the Departments of Animal Sciences, Biological Sciences, Chemistry and Biochemistry, Coatings and Polymeric Materials, Electrical & Computer Engineering (Bioengineering), Microbiological Sciences, Pharmaceutical Sciences, Physics, and Plant Sciences.

Financial Assistance

Self-funded students who provide their own support through sponsored funding sources (governmental or grant funding only) may contact CMB faculty members with whom they wish to work or the CMB Director to inquire which investigators are accepting students so that a successful research mentorship can be arranged.

While the CMB program offers a limited number of competitive graduate assistantships that includes a full tuition waiver, financial support is usually provided by the department or laboratory in which the student will carry out research. Therefore, applicants are encouraged to research participating faculty members' areas of expertise and identify them in their statement of purpose. Students are encouraged to contact those with whom they would like to work regarding availability of positions and funding. In instances where specific investigators are not identified in the Statement of Purpose, the Director will contact faculty members who are accepting new students for their appraisal of the application.

Code	Title	Credits
Required Courses		
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
BOT 820	Advanced Cell Biology	3
Doctoral Dissertation Research		
Each student is expected to seek out professional development by attending regular seminars in their home department or in conjunction with their research interests (for example, a seminar series or COBRE science series). Students are required to present at least one scientific seminar per year throughout the program. In addition, students will supplement their knowledge of molecular biology, cell biology, and research techniques by fulfilling the remaining credits in their plan of study with a selection from the following list of electives. Other appropriate electives may be used if approved by the student's advisory committee, as well as the program Director with input from the Steering Committee:		
ANSC 758	Molecular Biological Techniques in Animal Sciences	3
ANSC 773	Energy Metabolism	3
ANSC 774	Nitrogen Metabolism	3
ANSC 813	Domestic Animal Endocrinology	3
ANSC 828	Advanced Reproductive Biology	3
ANSC 830	Growth Biology	3
ANSC 875	Vitamins and Minerals	3
BIOC 673	Methods of Biochemical Research	3
BIOC 675	Computer Applications in Biochemistry and Molecular Biology	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 716	Protein and Enzyme Biochemistry	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 679	Biomedical Genetics and Genomics	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 729	X-Ray Structure Determination	2
CPM 771	Modern Methods of Polymer Characterization	3
ECE 713	Introduction to Lab-on-a-Chip Technology	3
MICR 775	Molecular Virology	3
MICR 781	Advanced Bacterial Physiology	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 684	Plant Tissue Culture and Biotechnology	3
PLSC 721	Genomics Techniques	2
PLSC 731	Plant Molecular Genetics	3
PPTH 759	Host-Parasite Genetics	3
PPTH 760	Advanced Mycology	4
PSCI 746	Neuropharmacology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
ZOO 682	Developmental Biology	3

Research

In addition to didactic credits, students take research credits to fulfill their dissertation studies on a topic of significant and original work. They must pass an oral and written preliminary examination which signifies their matriculation to doctoral candidacy. They also present a public presentation of their work in conjunction with a final dissertation examination on their research to attain the doctoral degree.

Laura Aldrich-Wolfe

Biological Sciences

Cornell University, 2006

Field: Community Ecology, Mycorrhizas, Plant-Fungal Interactions

Julia Bowsher

Biological Sciences

Duke University, 2007

Field: Evolutionary Development and Biology

Yongki Choi

Physics

City University of New York, 2010

Field: Early Detection of Cancer Cells, Single Molecule Enzymology, Biotechnology

Chris Colbert

Chemistry and Biochemistry

Purdue University, 2000

Field: Structure Biology with a Focus on the Biochemistry of Proteins Involved In Iron Import and Utilization

Carl Dahlen

Animal Sciences

University of Minnesota, 2009

Research Interests: Beef Cattle Production

Glenn Dorsam

Microbiological Sciences

Virginia Commonwealth University, 1998

Field: Epigenetic Regulation

Kendra Greenlee

Biological Sciences

Arizona State University, 2004

Field: Developmental Physiology and Immunology

Tim Greives

Biological Sciences

Indiana University, 2009

Endocrine Regulation of Seasonality, Reproductive Neuroendocrinology, Hormones and Behavior

Ang Guo

Pharmaceutical Sciences

Chinese Academy of Sciences - 2010

Field: Cardiovascular Disease

Jill Hamilton

Biological Sciences

University of British Columbia - 2012

Field: Plant Evolutionary Genomics

Stuart Haring

Chemistry and Biochemistry

Texas A&M University, 2013

Field: Cellular DNA Duplication (Replication) and Mutation Prevention (Repair)

Britt Heidinger

Biological Sciences

University of Iowa, 2004

Field: Physiological Ecology

Yagna Jarajapu

Pharmaceutical Sciences

Indiana University, 2007

Field: Bone Marrow Dysfunction and Vascular Repair in Diabetes, ACE2-Angiotensin-(1-7)/Mas Receptor Pathway in Bone Marrow Cells, Regulation of Bone Marrow Mobilization by Leptin

Jiha Kim

Biological Sciences

University of Georgia, 2006

Field: Tumor Microenvironment

Estelle Leclerc

Pharmaceutical Sciences

Glasgow Caledonian University, 2002

Field: Melanoma, Pancreatic Cancer; Monoclonal Antibodies as Diagnostic and Therapeutic Agents; Mechanism of RAGE Signaling

Guodong Liu

Chemistry and Biochemistry

Hunan University, 2001

Field: Development of Nano-Bioprobes for Biosensors and Bioassays for Detection of Nucleic Acids and Proteins

Phil Mcclean

Plant Sciences

University of Paris XI, 1994

Field: Dry Bean Genetics and Biotechnology

Dharmakeerthi "Keerthi" Nawarathna

Electrical and Computer Engineering

University of Houston, 2005

Field: Biomedical Engineering

Stephen O'Rourke

Pharmaceutical Sciences

University of Wisconsin-Madison, 1995

Field: Cerebral Vascular Function in Health and Disease

Birgit Pruess

Microbiological Sciences

Ruhr-Universitat Bochum, 1991

Field: Bacterial Physiology, Biofilm Biology, and Food Safety

Mohi Quadir

Coatings and Polymeric Materials

Freie University of Berlin, 2010

Field: Polymeric Materials for Drug Delivery

Sheela Ramamoorthy

Microbiological Sciences

Virginia Tech, 2006

Field: Virology, Immunology, and Vaccinology

Jiajia Rao

Plant Sciences

University of Massachusetts-Amherst, 2013

Field: Food Chemistry and Ingredient Technology

Katie Reindl

Biological Sciences

North Dakota State University, 2006

Field: Cancer Cell Biology and Pharmacology

Larry Reynolds

Animal Sciences

Iowa State University, 1983

Field: Nutrition and Pregnancy in Ruminants

Kenton Rodgers

Chemistry and Biochemistry

University of Iowa, 1988

Field: Inorganic and Bioinorganic Chemistry

Jane Schuh

Microbiological Sciences

North Dakota State University, 2002

Field: Environmental Allergic Asthma Triggered By Mold

Sangita Sinha

Chemistry and Biochemistry
Purdue University, 2000

Field: Biochemistry and Structural Biology of Host-Pathogen Interactions

Sarah Signor

Biological Sciences
University of California-Davis, 2013
Field: Insect Evolutionary Genomics

Kristine Steffen

Pharmaceutical Sciences
North Dakota State University, 2007
Field: Biology of Obesity and Post-Bariatric Outcomes, Gastrointestinal Microbiome Research

Chengwen Sun

Pharmaceutical Sciences
Jilin University, 2000
Field: Blood Pressure Regulation, Cell Signaling

Kendall Swanson

Animal Sciences
University of Kentucky, 2000
Field: Ruminant Nutrition, Energy Metabolism, Protein Metabolism, Pancreatic Function, Beef Cattle Production

Sathish Venkatachalem

Pharmaceutical Sciences
University of Madras
Field: Pulmonary Physiology and Pharmacology

Danling Wang

Electrical and Computer Engineering
Peking University, 2003; University Of Washington, 2014
Field: Sensor Design, Fabrication, and Application of Early-State Human Disease Monitoring and Diagnosis

Alison Ward

Animal Sciences
University of Saskatchewan, 2011
Field: Livestock Epigenetics, Nutrient-Gene Interactions, and Developmental Programming

John Wilkinson

Chemistry and Biochemistry
Vanderbilt University, 2001
Field: Cancer Cell Metabolism, Cell Death Pathways, Mitochondrial Gene Expression, Animal Models of Tumorigenesis

Qifeng Zhang

Electrical and Computer Engineering
Peking University, 2001
Field: Nanomaterials for Sensor and Biomedical Applications, Nanotechnology

Cereal Science

Department Information

- **Department Chair:**
Richard Horsley, Ph.D.
- **Program Coordinator:**
Frank Manthey, Ph.D.
- **Department Location:**
Plant Sciences, Loftsgard Hall
- **Department Phone:**

(701) 231-7971

- **Department Web Site:**

www.ag.ndsu.edu/cerealscience/ (<http://www.ag.ndsu.edu/cerealscience/>)

- **Application Deadline:**

International applications are due May 1 for Fall and October 15 for Spring. Domestic applicants should apply at least one month prior to the start of classes.

- **Credential Offered:**

Ph.D., M.S.

- **English Proficiency Requirements:**

TOEFL iBT 71, IELTS 6

Program Description

Cereal Science is a graduate program in the College of Agriculture Food Systems and Natural Resources and is administered by the Department of Plant Sciences. The Cereal Science graduate program offers graduate study leading to the M.S. and Ph.D. degrees in Cereal Science. Advanced work may involve research in the areas of proteins, carbohydrates, enzymes, and lipids of cereals, legumes, and other northern-grown crops; barley malting and brewing; and wheat milling, baking, and pasta processing. Functional foods and stability of bioactive compounds in food systems are also predominant areas of research.

The program has a close working relationship with the Northern Crops Institute and the USDA Hard Red Spring and Durum Wheat Quality Laboratory housed in the Harris Hall complex.

Research Facilities and Equipment

Faculty in the Cereal Science graduate program maintain specialized equipment that evaluates cereal and food quality, including laboratory equipment such as an ICP spectrophotometer, gas chromatographs, LC-MS, GC-MS, high-performance liquid chromatographs, various electrophoretic devices, a differential scanning calorimeter, and Rapid ViscoAnalyzer.

Flour mills, ranging up to pilot-plant size; two completely equipped bake shops; continuous bread-baking equipment; rheological instruments for dough testing; several pasta-processing units; malting equipment; Asian noodle making equipment; soy milk/tofu processing machines; a wet processing pilot plant; laboratory-scale UHT processing unit; HT/ST extruder; and a microbrewery are some examples of the specialized equipment.

The Cereal Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School requirements and have adequate preparation in biochemistry/chemistry and the biological sciences, including microbiology.

Financial Assistance

Applicants must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Cereal Science graduate program. All graduate students must qualify and be awarded a Graduate Research Assistantship. Alternative support, equivalent to a Graduate Research Assistantship, may be provided to a student by a sponsor such as a private company, university or government. The number of Graduate Research Assistantships varies from year to year, depending on industrial support and grant funding. Graduate tuition is waived for students with assistantships.

Selection of the major adviser will be made on the basis of the student's interest, source of funding, the availability of faculty members and a common desire of the student and professor to work together on a program that will enable the student to attain the desired degree. If a Graduate Research Assistantship is assigned to a specific research project, the project leader will be the major adviser of the Graduate Research Assistant.

Master of Science

The Master of Science program requires a minimum of 21 semester credits of course work with an overall GPA of 3.0 or better, as well as 10 research credits (CFS 798). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first four and six months of study, respectively. For M.S. students, a final oral examination is required, where the student defends the thesis and is asked questions covering academic subject matter.

Code	Title	Credits
CFS 650	Cereal Technology	3
CFS 790	Graduate Seminar	2
PLSC 710	Professional Development I	1
CFS 798	Master's Thesis	10
Statistics (one of the following courses)		3

PLSC 724	Field Design I	
STAT 662	Introduction to Experimental Design	
STAT 725	Applied Statistics	
Technology Group		6
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 758	Fundamentals of Flour Testing and Bakng (s/b Baking)	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
MICR 653	Food Microbiology	
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
CFS 765	Advanced Cereal and Food Chemistry I	
CFS 766	Advanced Cereal and Food Chemistry II	
MICR 752	Advanced Topics in Food Safety Microbiology	
Total Credits		30 (minimum)

Doctorate of Philosophy (Ph.D.)

The Graduate School minimum requirement is 90 credits or no fewer than 60 credits if an M.S. degree is earned prior to the Ph.D.

The Ph.D. program requires the completion of a minimum of 31 semester credits of required course work with an overall GPA of 3.0 or better, as well as 25 research credits (CFS 899). Remaining credits can be fulfilled as elective courses or as additional research credits (CFS 899). With assistance from the adviser, a supervisory/advisory and examining committee is established and a plan of study developed. The student is required to prepare and defend a written research proposal. The plan of study and written research proposal must be approved within the first six and nine months of study, respectively. Ph.D. candidates are required to take a preliminary written and oral examination covering academic subject matter and a final oral defense of a research-based dissertation.

Code	Title	Credits
CFS 650	Cereal Technology (Students that have previously taken CFS 650 can opt to take additional CFS 899 credits or another 600/700 course worth 3 credits.)	3
PLSC 710	Professional Development I	1
PLSC 711	Professional Development II	1
CFS 765	Advanced Cereal and Food Chemistry I	4
CFS 766	Advanced Cereal and Food Chemistry II	4
PLSC 790	Graduate Seminar	2
CFS 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	30
Statistics (one of the following courses)		3
STAT 662	Introduction to Experimental Design	
PLSC 724	Field Design I	
STAT 725	Applied Statistics	
Technology Group		9
CFS 630	Food Unit Operations	
CFS 670	Food Processing II	

CFS 671	Food Processing Laboratory	
CFS 759	Milling	
CFS 760	Pasta Processing	
CFS 761	Malting and Brewing	
Science Group		6
CFS 660	Food Chemistry	
CFS 661	Food Chemistry Laboratory	
CFS 662	Food Ingredient Technology	
CFS 664	Food Analysis	
CFS 672	Cereal and Food Fermentation	
CFS 674	Sensory Science of Foods	
CFS 764	Carbohydrate Chemistry	
MICR 752	Advanced Topics in Food Safety Microbiology	
Additional Credits		30

- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer in 10 credits of CFS 798 or equivalent toward the 90 credit Graduate School requirement.
- If the student has had an equivalent statistics course to the one stated above or if the student requires additional training in statistics, the appropriate statistics course will be taken as agreed upon by the Graduate Student and the Student's Advisory Committee.
- Students entering the program with an eligible M.S. Degree (i.e. within the last ten years) may transfer 20 credits of Graduate level course work toward the 90 credit Graduate School requirement. Additional credits may include research credits or coursework.

An accelerated **Master of Science program** is available for students currently enrolled in the undergraduate Food Science program at North Dakota State University. Students will be required to complete 31 credits consisting of 19 didactic credits (600/700 level), 2 graduate seminar credits (CFS 790) and 10 research credits (CFS 798) and maintain a graduate GPA of 3.0. Students will be required to complete a thesis.

Fifteen (15) of the didactic credits can be used to meet the requirement for the B.S. degree. A graduate stipend or assistantship will not be provided until the B.S. degree is granted. However, students are eligible for hourly funding (i.e., time slip) if available at any time after being accepted into the accelerated M.S. program and may qualify for tuition waiver on graduate courses. Upon completion of the B.S. degree requirement, students are eligible for assistantships pending availability. Differential tuition applies. Graduate tuition rates will apply to graduate level courses while undergraduate tuition applies to undergraduate courses.

Eligibility and Admission:

An online submission to the Graduate School is required. Students interested in the accelerated M.S. degree should consider submitting the application during their junior year or just before their senior year. For eligibility and admission please see information below.

At the time of application, the student:

- Must have completed at least **60 credits** towards their B.S. degree before conditional admission.
- Must have completed at least **30 credits** at NDSU before conditional admission.
- Must have a cumulative **GPA of 3.5** at NDSU to be eligible for conditional admission.
- Must have completed an introductory food science course (CFS 200 Introduction to Food Systems or CFS 210 Introduction to Food Science and Technology), introductory food processing (CFS 370 Food Processing I), MATH 146 Applied Calculus I or higher and general chemistry (CHEM 121 General Chemistry I).
- Must have completed or be concurrently taking MICR 350 General Microbiology, CHEM 341 Organic Chemistry I and BIOC 460 Foundations of Biochemistry and Molecular Biology I. MICR 202 Introductory Microbiology, CHEM 240 Survey of Organic Chemistry, and BIOC 260 Elements of Biochemistry courses, respectively, cannot serve as substitutes for the aforementioned courses.

Rules for Accepted Students:

- All admissions will be conditional. The minimum condition is completion of the B.S. degree prior to full standing in M.S. program.
- No undergraduate courses (100-400) may be counted toward a M.S. degree.
- Courses completed at the 600 level prior to be accepted to the program may be counted toward a M.S. degree.
- A maximum of 15 credits in the M.S. program can be used to meet the requirements for the B.S. degree.
- Students entering the M.S. degree with a B.S. degree in hand may not use courses earned as part of the bachelors program for the M.S. requirements.
- The student must meet all of the requirements that would normally be expected of a student in the M.S. program.

- All incoming graduate students will be given a written examination before the beginning of their first semester to assess their proficiency in English / Scientific writing.
- Graduate stipend or assistantship will not be provided until B.S. degree is granted. However, students are eligible for hourly funding (time slip) if available and may qualify for a tuition waiver. Upon completion of the B.S. degree requirement, students are eligible for and assistantships pending availability.

Faculty

Bingcan Chen, Ph.D.

University of Massachusetts-Amherst, 2012

Research Interests: Food and Cereal Chemistry

Frank Manthey, Ph.D.

North Dakota State University, 1985

Research Interests: Durum Wheat Quality, Pasta/Noodle Processing, and Milling

Jiajia Rao, Ph.D.

University of Massachusetts-Amherst, 2013

Research Interests: Food Chemistry and Ingredient Technology

Paul B. Schwarz, Ph.D.

North Dakota State University, 1987

Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.

University of Idaho, 1989

Research Interests: Plant Metabolism and Food Security

Senay Simsek, Ph.D.

Purdue University, 2006

Research Interests: Wheat Quality and Carbohydrate Research

Anuradha Vegi, Ph.D.

North Dakota State University, 2008

Research Interests: Teaching Techniques

Affiliate/Adjunct Faculty

Linda Dykes, Ph.D.

Texas A&M University, 2008

Research Interests: Wheat Quality

Jae Ohm, Ph.D.

Kansas State University, 1996

Research Interests: Cereal Chemistry

Chemistry

Department Information

- **Department Chair:**
Gregory Cook, Ph.D.
- **Graduate Coordinator:**
Sangita Sinha, Ph.D.
- **Department Location:**
Ladd Hall
- **Department Phone:**
(701) 231-8694
- **Department Web Site:**
www.ndsu.edu/chemistry/ (<http://www.ndsu.edu/chemistry/>)
- **Application Deadline:**
April 15 for fall, October 31 for spring. Spring admissions depend on the availability of fellowships and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.

- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE (general and subject recommended, but not required)
- **English Proficiency Requirements:**
TOEFL iBT 81 (23 speak; 21 write) –TA, 71 – RA; IELTS 6.5 – TA; 6 – RA

Program Description

The Department of Chemistry and Biochemistry offers programs leading to the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Chemistry. At the start of the first year of study, entering graduate students take entrance examinations in analytical, inorganic, organic, and physical chemistry, as well as chemistry and biochemistry. The graduate student progress committee uses these exams for advisory purposes in recommending course work during the first year. As a consequence, programs are individually tailored to the needs of each student. Typically, course work is completed in one to one-and-a-half years for M.S. candidates, and two years for Ph.D. candidates, leaving later years for full-time thesis research. The typical time to complete a graduate degree averages three years for the M.S. degree and approximately five years for the Ph.D.

Research Opportunities and Infrastructure

The Department of Chemistry and Biochemistry has more than 10 externally funded faculty research programs. Research expenditures have averaged \$1.8 million over the last 10 years, with more than \$2.2 million in the last two years.

All research and most teaching activities within the department occur within three centrally-located buildings, including two connected facilities, Ladd Hall and Dunbar Laboratory, as well as the Quentin Burdick Building, located across the street.

Most departmental offices, classrooms and teaching labs, as well as some research labs are located in Ladd Hall, while Dunbar and the third floor of the Quentin Burdick Building primarily consist of research laboratories. Ladd Hall also houses departmental glass, machine, and electronics shops.

Modern instrumentation is vital to research in the chemical sciences. The quality and quantity of instrumentation within the department has been greatly enhanced in the last few years through aggressive fundraising efforts and university matching support.

The department has recently upgraded its mass spectrometry capabilities to include a Bio-TOF III with accurate mass analysis, ESI and CI ionization; as well as an Esquire 3000 Plus - an Ion trap instrument with MS-MS and proteomics capabilities. A dedicated LC can be integrated with the both the instruments.

The Organic Spectroscopy Laboratory is primarily devoted to maintenance and operation of Nuclear Magnetic Resonance (NMR) spectrometers. The facility includes three modern high-field instruments: Varian 500, 400, and 300 MHz spectrometers. All have multinuclear, 2- D, and variable temperature capabilities, and the 400 MHz instrument has been recently upgraded for solids capabilities. This center also includes the departmental FTIR.

The Materials Characterization Laboratory houses the departmental crystallography facilities including a Bruker single crystal CCD X-ray diffractometer with low temperature capabilities, a Philips MPD (Multi- Purpose Diffractometer), two Philips X-ray powder diffractometers, and a KeveX X-ray fluorescence unit. CHN Elemental analysis, thermogravimetric analysis (TGA), differential scanning calorimetry (DSC), and differential thermal analysis (DTA) are also available.

The Center for Protease Research - Core Biology Facility is a new facility housing equipment and technical personnel for performing bioassay, cell and tissue culture, and molecular biology experiments. For bioassays, the facility has a fluorimeter capable of top or bottom reading and the capability to handle both 96- and 384-well plates. For sample preparation, researchers can utilize cell and tissue culture capabilities such as flow hoods and culture chambers. In addition, RT-PCR and FPLC protein purification technology is available.

The chemistry library, located in Ladd Hall, provides graduate students and faculty with convenient 24-hour access to more than 200 journals and approximately 10,000 volumes. Literature searching via SciFinder is supported.

Prospective students are encouraged to visit the Department of Chemistry and Biochemistry website (<http://www.ndsu.edu/chemistry/>) for the latest descriptions of research programs and instrumentation.

The graduate programs in chemistry are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing to the program, the applicant must meet the Graduate School's admission requirements, have adequate preparation for the study of chemistry at the graduate level, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Chemistry and Biochemistry.

Graduate students in the Department of Chemistry and Biochemistry are supported during both the academic year and during summer months by either teaching assistantships (TA) or research assistantships (RA). As of the 2014-2015 academic year, the standard stipend is \$22,000 per year for both RAs and TAs. University tuition (no fees) is waived for all TAs and RAs in good academic standing.

Master of Science

The Master of Science program requires the completion of a total of 30 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 16 semester credits from letter-graded course work.

Code	Title	Credits
Required Courses		
CHEM 720	Introduction to Chemical Research	2
CHEM 790	Graduate Seminar (second year seminar)	1
or BIOC 790	Graduate Seminar	
UNIV 720	Scientific Integrity	1
CHEM 790	Graduate Seminar (defense seminar)	1
or BIOC 790	Graduate Seminar	
Didactic Credits (601-689, 691; 700-789, 791; 800-889 and 891)		16 *
CHEM 798	Master's Thesis	6-10
or BIOC 798	Master's Thesis	
Total Credits Required		30
As part of total semester credits, the following departmental courses are recommended for students based on discipline:		
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 725	Advanced Survey of Inorganic Chemistry	3
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 741	Physical Organic Chemistry I	4
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
BIOC 665		
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2
CHEM 764	Dynamics	2

* A minimum of 10 must be from courses numbered 701-789; 791 or 800-889; 891

Doctor of Philosophy

The Ph.D. program requires the completion of a total of 90 graduate semester credits with an overall GPA of 3.0 or better. This total is comprised of both class work and research credit, but must consist of at least 27 semester credits from letter-graded course work.

Code	Title	Credits
Required Didactic Courses		
CHEM 720	Introduction to Chemical Research	
UNIV 720	Scientific Integrity	
CHEM 725	Advanced Survey of Inorganic Chemistry	
CHEM 732	Advanced Survey of Analytical Chemistry	
CHEM 741	Physical Organic Chemistry I	
CHEM 759	Advanced Survey of Physical Chemistry	
Required Non-Didactic Courses		
CHEM 790	Graduate Seminar (second year seminar)	
CHEM 790	Graduate Seminar (proposal seminar)	
CHEM 790	Graduate Seminar (defense seminar)	
CHEM 899	Doctoral Dissertation (Number of research credits determined by student and supervisory committee)	
Additional credits numbered 601 - 689, 691, 700 - 789 and 791 may also count toward the 90 credit total required by the College of Graduate and Interdisciplinary Studies if approved by the student's advisory and examination committee.		
Total Credits		90

* A student matriculating with a master's degree, including one earned at an international institution, must earn not fewer than 60 graduate credits at NDSU. These credits must include the 19 listed above under Required Didactic Courses. Courses numbered 601-689 may be used for the Plan of Study as long as they have not been taken in an undergraduate or previous graduate program. Approved courses are Department of Chemistry & Biochemistry 625, 626, 627, 628, 630, and 676.

ADDITIONALLY, The following departmental courses ARE available for students; CONSULT WITH COMMITTEE FOR RECOMMENDATIONS:

Code	Title	Credits
Analytical		
CHEM 632	Analytical Chemistry II	3
CHEM 730	Separations	2
CHEM 736	Mass Spectrometry	2
Biochemistry and Molecular Biology		
BIOC 673	Methods of Biochemical Research	3
BIOC 674	Methods of Recombinant DNA Technology	3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
Inorganic		
CHEM 724	Chemical Applications of Group Theory	1
CHEM 727	Organometallic Chemistry	3
CHEM 728	Physical Methods for Chemical and Biomolecular Research	2
CHEM 744	Organic Spectroscopy	2
Organic		
CHEM 742	Physical Organic Chemistry II	2
CHEM 744	Organic Spectroscopy	2
CHEM 745	Organic Synthesis	4
Physical		
CHEM 665	Survey of Physical Chemistry	4
CHEM 760	Statistical Thermodynamics	4
CHEM 763	Kinetics	2

CHEM 764	Dynamics	2
CHEM 676	Introduction to Computational Quantum Chemistry	3

Each student chooses a thesis adviser within six months of beginning graduate school. As this is one of the most important decisions made in graduate school, students are strongly urged to visit multiple faculty members to discuss research opportunities. In addition, faculty seminars during the fall semester are designed to acquaint new students with the available research programs.

By the end of the first academic year, each student selects an advisory and examination committee, which consists of the thesis adviser, two other faculty members in the chemistry department, and one faculty member from a department outside the Department of Chemistry and Biochemistry.

Admission to candidacy for the Ph.D. degree is accomplished by satisfying three requirements:

1. satisfactory performance in course work with a minimum 3.0 grade point average,
2. satisfactory performance in comprehensive examinations taken by the end of the 4th semester, and
3. satisfactory defense of an original research proposal on a topic approved by the student's advisory committee.

The defense of this proposal must occur at least eight months prior to the final oral examination. Following completion of dissertation research, the candidate must complete a written dissertation and an oral presentation to the department and advisory committee.

Uwe Burghaus, Ph.D.

Free University of Berlin, 1995

Postdoctoral, University of Genoa, Italy, 1995-1997

Research Area: Surface Physical Chemistry

Gregory R. Cook, Ph.D.

Michigan State University, 1993

Postdoctoral, Stanford University, 1994-1996

Research Area: Synthetic Organic Chemistry

John F. Hershberger, Ph.D.

Yale University, 1986

Postdoctoral, Columbia University, 1986-1989

Research Area: Experimental Physical Chemistry, Laser Kinetics

Denley Jacobson, Ph.D.

Purdue University, 1984

Postdoctoral, California Institute of Technology, 1984-1986

Research Area: Gas Phase Ion Chemistry

Svetlana Kilina, Ph.D.

University of Washington, Seattle 2007

Los Alamos National Lab, 2007-2010

Research Area: Computational Chemistry

Alexey Leontyev, Ph.D.

University of Northern Colorado, 2015

Research Area: Chemistry Education and Assessment

Guodong Liu, Ph.D.

Hunan University, 2001

Postdoctoral, New Mexico State University, 2002-2004;

Postdoctoral, Pacific Northwest National Laboratory, 2004-2006

Research Area: Nanotechnology and Biological Sensing

James Nyachwaya, Ph.D.

University of Minnesota, 2012

Research Area: Chemistry / STEM Education

Seth C. Rasmussen, Ph.D.

Clemson University, 1994

Postdoctoral, University of Oregon, 1995-1999

Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Kenton R. Rodgers, Ph.D.

University of Iowa, 1988

Postdoctoral, Princeton University, 1989-1993
Research Area: Inorganic and Bioinorganic Chemistry

Mukund P. Sibi, Ph.D.

City University of New York, 1980
Postdoctoral, Dartmouth College, 1980-1982; University of Waterloo, 1982-1985
Research Area: Synthetic Organic Chemistry; Natural Products

Wenfang Sun, Ph.D.

Institute of Photographic Chemistry, Chinese Academy of Sciences, 1995
Postdoctoral, University of Alabama, Birmingham, 1997-1999
Research Area: Organic Materials Chemistry

Pinjing Zhao, Ph.D.

Cornell University, 2003
Postdoctoral, Yale University, 2004-2006; University of Illinois at Urbana- Champaign, 2006-2007
Research Area: Inorganic and Organometallic Chemistry

Civil and Environmental Engineering

Department Information

- **Department Chair:**
David R. Steward, Ph.D.
- **Graduate Program Coordinator:**
Kalpana Katti, Ph.D.
- **Department Location:**
201 Civil and Industrial Engineering Bldg.
- **Department Phone:**
(701) 231-7244
- **Department Web Site:**
www.ndsu.edu/cee/ (<http://www.ndsu.edu/cee/>)
- **Application Deadline:**
February 15 for fall admission; September 15 for spring admission
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Civil and Environmental Engineering offers the M.S. and Ph.D. degrees in civil engineering and the M.S. degree in environmental engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering in which civil engineering is a possible area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology and Transportation and Logistics.

Specialty areas in the M.S. and Ph.D. degrees in civil engineering include construction, environmental, geotechnical, materials, structural, transportation, and water resources engineering. Other related areas are also accommodated. The academic and research foci are tailored to individual needs and interests. To complement the major area of study, additional courses are often selected from other disciplines. The programs are designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the civil engineering profession.

Application to the Civil Engineering program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must have adequate preparation in civil engineering. A master's degree in civil engineering is preferred for applicants to the Ph.D. program.

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to the Graduate School.

For teaching assistantships, TOEFL and additional requirements for eligibility can be found on the Graduate School webpage.

The Master of Science degree is offered in the thesis format. This format emphasizes research, and the ability to analyze and interpret data and to prepare a scholarly thesis. The student and adviser develop a program of study consisting of at least 30 credit hours of graduate level material to meet individual educational goals. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis is required.

The Doctor of Philosophy degree requires a total of 90 credits beyond the baccalaureate degree in civil engineering with an overall GPA of 3.0 or higher (60 credits beyond an M.S. degree in Civil Engineering or a sub-area of Civil Engineering) for graduation. A dissertation advisory committee should be formed and a plan of study should be filed by the end of first year after admission. A minimum of 30 hours of additional course work chosen by the student and his/her advisory committee from appropriate existing Civil Engineering graduate courses, new courses, and courses outside the department must be completed.

An M.S. degree from another institution may substitute for up to 30 credits of the 90 credits required; however, suitability of transfer or use of courses and research credits in the plan of study would be decided by the adviser and advisory committee.

A comprehensive preliminary exam is administered after completion of the greater portion of the course work. The committee chair will coordinate the examination. The format and duration will be determined by the committee. The student will present a research proposal within one year after the preliminary examination. A minimum of 30 and a maximum of 40 credit hours can be earned for research, preparation, and defense of a dissertation in Civil Engineering. A minimum of 12 credit hours in a minor or cognate area as deemed appropriate by the student and the advisory committee may be completed by the student. The student will defend his/her dissertation in a final examination attended by the advisory committee members and other academics.

Beena Ajmera, Ph.D.

Virginia Polytechnic Institute and State University, 2015

Research Interests: Geotechnical Earthquake Engineering, Static and Dynamic Behavior of Soils and Rocks, Static and Dynamic Laboratory Soil Testing, Fundamental Behavior of Geomaterials from Mineralogical and Chemical Analyses, Use of Recycled Materials in Soil Modification, Ground Improvement Techniques, Soil and Rock Slope Stability

Achintya N. Bezbaruah, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.

University of California, Davis, 2002

Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Ying Huang, Ph.D.

Missouri University of Science & Technology, 2012

Research Interests: Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Intelligent Transportation Systems, Applications of Adaptive and Smart Materials, Finite Element Modeling and Multi-Hazard Assessment and Mitigation

Syed Md Iskander, Ph.D.

Virginia Polytechnic Institute and State University, 2019

Research Interests: Sustainable Waste Management: Food Waste Treatment, Landfill Leachate Treatment, Environmental Health: Disinfection Byproducts, Antibiotic Resistance Genes, Microplastics, Water-Energy Nexus: Desalination, Membrane Fabrication, Advanced Oxidation, Environmental Biotechnology: Anaerobic Biotechnology, Bioelectrochemical Systems

Dinesh Katti, Ph.D., P.E.

University of Arizona, 1991

Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.

(Graduate Coordinator)

University of Washington, 1996

Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Trung B. Le, Ph.D.

University of Minnesota

Research Interests: Hydraulics, Fluid Mechanics, Numerical Methods for Fluid-Structure Interaction

Wei Lin, Ph.D.

State University of New York at Buffalo

Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhibin Lin, Ph.D., P.E.

University of Wisconsin, 2010

Research Interests: Advanced Materials, High-Performance, Resilient and Sustainable Bridge Systems, Structural Durability and Structural Health Monitoring in Bridges and Earthquake Engineering

Kelly Rusch, Ph.D., P.E.

Louisiana State University, 1992

Research Interests: Microbial System Design and Modeling, Biofuels and Bioproducts, Engineering Education Research, Aquaculture Engineering, and Water and Wastewater Treatment.

David R. Steward, Ph.D., P.E., PG, F.ASCE

University of Minnesota

Research Interests: Engineering Mathematical and Computational Methods, Groundwater Flow and Analysis, Interdisciplinary Water Resources: Water and Society

Wenjie Xia, Ph.D.

Northwestern University, 2016

Research Interests: Multiscale Modeling of Structural Materials, Polymer and Nanocomposites, Granular and Soft Matters, Bioinspired Materials, Mechanobiology, Computational Mechanics, Data-Enabled Design of Multifunctional Materials

Mijia Yang, Ph.D., P.E.

University of Akron, 2006

China University of Mining and Technology, 1999

Research Interests: Advanced Materials, Structural Assessment, Solid Mechanics

Ravi Kiran Yellavajjala, Ph.D., P.E.

University of Notre Dame, 2014

Research Interests: Experimental and Theoretical Mechanics, Constitutive Modeling of Materials, Numerical Methods, Sensitivity Analyses of Structural Response, Forensic Failure Analysis and Advanced Visualization Techniques.

Adjunct & Emeritus

Eakalak Khan, Ph.D. (adjunct)

University of California, Los Angeles, 1997

Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Denver D. Tolliver, Ph.D. (adjunct)

Virginia Polytechnic University, 1989

Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D. (adjunct)

North Dakota State University, 1991

Research Interests: Water and Wastewater Treatment, Solid Waste

G. Padmanabhan, Ph.D. (emeritus)

Purdue University, 1980

Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Coatings & Polymeric Materials

Department Information

- **Department Chair:**
Dean C. Webster, Ph.D.
- **Department Location:**
Research I, Research Park
- **Department Phone:**
(701) 231-7633
- **Department Web Site:**
www.ndsu.edu/cpm/ (<http://www.ndsu.edu/cpm/>)
- **Application Deadline:**
April 15 is the priority deadline for fall consideration. Applications are reviewed on a rolling basis.

- **Credential Offered:**

Ph.D., M.S.

- **Test Requirement:**

GRE: Required for international applicants (unless the applicant has earned a bachelor's degree from a regionally accredited university within the United States); Recommended for all applicants

- **English Proficiency Requirements:**

TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Coatings and Polymeric Materials offers graduate studies leading to the M.S. and Ph.D. degrees in polymers and coatings science, and students in the department may also get a Ph.D. in the Materials and Nanotechnology program. The departmental research bridges between basic and applied research in the field of polymers and coatings. There is a unique atmosphere and opportunities for cross-disciplinary research experience, often accomplished by multi-disciplinary research activities with, for example, chemistry or engineering departments. Advanced research work involves specialized training in the following areas: colloidal and interfacial chemistry of polymers and coatings, polymer synthesis, adhesion, durability, spectroscopy, corrosion, electrochemistry, nanomaterials design and synthesis, computational modeling, life cycle assessment, and rheology. The department has an industrial advisory board consisting of leading industrial scientists and/or former graduates who provide new directions and other feedback to the program.

During the fall semester, the faculty meet with the new students to acquaint them with the research programs in the department. Because students are required to team with a research adviser by the end of the first semester in residence, they are required to discuss research opportunities with all faculty members.

Research Facilities and Equipment

The Department of Coatings and Polymeric Materials is housed in a modern building in the NDSU Research and Technology Park on the northwest corner of the campus. This building consists of nearly 40,000 square feet of space for research and teaching. Modern equipment and instrumentation have profoundly influenced the development of instruction and are the cornerstones of research in the chemical sciences. The Department of Coatings and Polymeric Materials possesses extensive instrumentation to characterize polymers and colloids ranging from state-of-the-art spectrometers, thermal analysis systems, advanced electrochemical equipment to study corrosion, and atomic force microscopes, as well as equipment for paint making and testing. Other modern research facilities, including state-of-the-art electron microscopy, high-performance computing and NMR laboratories, are readily available to all researchers on the NDSU campus and in the NDSU Research and Technology Park.

The Department of Coatings and Polymeric Materials graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full standing status to the program, the applicant must meet the Graduate School admission requirements and have adequate preparation in a science or engineering field.

Financial Assistance

The student must first be accepted in full or conditional status before he/she is eligible for an assistantship in the Department of Coatings and Polymeric Materials. To be considered for an assistantship, the Graduate School application packet must be complete no later than April 15. International students must also submit a TOEFL or IELTS score. General and subject GRE scores are highly encouraged if they are available to the student. Graduate students may be supported during both the academic year and summer months by either teaching or research assistantships.

The current monthly stipend is \$1,750+ per month, for an annual stipend of \$21,000+. University tuition is waived for qualified TAs and RAs

The Master of Science program requires the completion of 16 credits of letter-graded course work with an overall GPA of 3.0 or better. The Ph.D. program requires the completion of 27 credits of letter-graded course work with an overall GPA of 3.0 or better. Each student must choose a thesis (research) adviser within three to six months of beginning graduate school. After two semesters, the student must also select a supervisory committee. This committee advises the student and administers oral examinations. Candidates for the M.S. program normally satisfy course requirements within one year of study. Ph.D. candidates typically take about two years to complete courses, leaving later years for full-time dissertation research.

Candidacy qualifying examinations are administered twice annually. All Ph.D. candidates are required to pass the qualifying exam and defend an original written research proposal at least eight months prior to the final dissertation examination. The proposal topic must be approved by the student's research adviser, and the supervisory committee administers the oral exam. Lastly, following completion of dissertation research and the presentation of an acceptable written dissertation, the candidate defends it before the supervisory committee.

Accelerated M.S. Program

An accelerated M.S. degree program is available for students enrolled in a major at NDSU and the Coatings and Polymeric Materials minor program. This program will allow qualified students to complete a B.S. plus M.S. degree in as little as five years. Students should declare their intent to enroll in the accelerated M.S. program during their sophomore year. Contact the department for more information on the requirements for the program.

Dante Battocchi, Ph.D.

University of Trento, 2001

North Dakota State University, 2012

Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Stuart G. Croll, Ph.D.

University of Leeds, 1974

Research Interests: Weathering Durability of Coatings, Service Lifetime Prediction, Colloidal Stability, Molecular Modeling, Pigment-Polymer Interactions, Film Formation Processes, Coating Physics, Art Conservation

Erik Hobbie, Ph.D.

University of Minnesota, 1990

Research Interests: Nanotechnology, Nanoparticles Polymers, Optics and Rheology

Ghasideh Pourhashem, Ph.D.

Drexel University, 2014

Research Interests: Environmental impact assessment to inform decision making, Life cycle assessment (LCA) and techno-economic analysis (TEA) of bio-based products, Industrial Ecology, bio-based product policy

Mohiuddin Quadir, Ph.D.

Freie University Berlin, Germany, 2010

Research Interest: Organic Polymer Chemistry, Functional self-assembly of polymers, Biomaterials, Application-guided modification of polymers for pharmaceutical and medical use, Bio-based materials

Bakhtiyor Rasulev, Ph.D.

Uzbek Academy of Science, 2002

Research Interests: Cheminformatics, Computational Chemistry of Polymers and Coating Materials, Quantitative Structure-Activity Relationship, Predictive Models Development, Molecular Modeling, Nanoparticles, Physico-Chemical Properties and Toxicity Assessment

Andriy Voronov, Ph.D.

Lviv Polytechnic National University, 1994

Research Interests: Polymer Synthesis, Micellar Self-Assembly, Sustainable Biobased Polymeric Materials, Responsive Polymers for Biomedical Applications, Polymers for Biomimetic Conversion of Biomass, Polymer Latexes, Polymer Hydrogels, Polymer Thin Films.

Dean Webster, Ph.D.

Virginia Polytechnic Institute and State University, 1984

Research Interests: Polymer Synthesis, Thermosets, Polymerization Reactions, Bio-based materials, Marine Coatings, Combinatorial and High Throughput Methods.

Research Faculty

Dennis E. Tallman (formerly of NDSU Dept. of Chemistry)

The Ohio State University, 1968

Research Interests: Analytical And Physical Electrochemistry, Corrosion Mechanisms, Corrosion Control By Coatings, Electroactive Conducting Polymers, Scanning Probe Techniques Microelectrodes And Microelectrode Arrays

Adjunct Faculty

Bret Chisholm, (PolyOne Corporation)

University of Southern Mississippi, 1993

Research Interests: Electrochemical Noise Measurements, Scanning Vibrating Electrode Technique (Svet), Organic Metal-Rich Primers Characterization and Development, Materials Protection and Metal Corrosion

Matthew S. Gebhard (DSM)

Stanford University, 1990

Research Interests: Rheology in Coatings Processes, Final Film Properties, Architectural Binder Technology

Victoria Gelling, Ph.D. (Sherwin-Williams)

North Dakota State University, 2002

Research Interests: Electrochemistry, Corrosion, Environmentally Compliant Corrosion Inhibitors

Loren W. Hill, Ph.D. (Consultant)

Pennsylvania State University, 1965

Research Interests: Structure-Property Relationships of Thermoset Coatings, Dynamic Mechanical Analysis

Theodore Provder, Ph.D. (Consultant)

University of Wisconsin, 1965

Research Interests: Chromatographic and Separation Methods of Polymers, Particle Size Measurements

Richard R. Roesler, Ph.D. (Consultant)

University of Washington, 1969

Research Interests: Blocked Polyisocyanates, Polyurethane Dispersions, High Solids Amine Functional Coreactants for Polyisocyanate

Brian S. Skerry, Ph.D. (Sherwin-Williams)

University of Manchester, 1980

Research Interests: Corrosion and Coatings

College Teaching Certificate

Department Information

- **Program Director:**
Melissa Vosen Callens, Ph.D.
- **Department Location:**
FLC 314, Office of Teaching and Learning
- **Department Phone:**
(701) 231-6336
- **Department Web Site:**
www.ndsu.edu/otl/programs/college_teaching_certificate/ (http://www.ndsu.edu/otl/programs/college_teaching_certificate/)
- **Credential Offered:**
Certificate (Students enrolled in the CTC program must be concurrently enrolled in a graduate program leading to a degree.)

Program Description

The College Teaching Certificate (CTC) is a three-semester (9-credit) graduate certificate in pedagogy for NDSU graduate students and individuals with a graduate degree who work on campus. Students study contemporary education research and gain experience in the teaching and learning process through microteaching modules, field experience, peer observations, and a structured practicum.

To be admitted to the program, the applicant must:

1. Be a current degree-seeking student in a graduate program or a NDSU employee with a graduate degree.
2. Submit a completed College Teaching Certificate Application (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/CTC_App_.pdf) to the Graduate School.
3. Hold a baccalaureate degree from an educational institution of recognized standing (graduate student) or hold a graduate degree from an educational institution of recognized standing (NDSU employee).
4. At the baccalaureate level, have earned a cumulative grade point average (GPA) in all courses of at least 3.0 on a 4.0 scale.

Code	Title	Credits
The College Teaching Certificate is a three-semester, 9 credit program		
Foundation Courses (choose one)		3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences (Fall, annually)	
ENGL 764	Classroom Strategies For TA'S	
HDFS 802	Teaching Developmental Science (Spring every odd year, 2017, 2019, 2021)	
STEM 810	Teaching College Science (Fall, annually)	
Electives (choose one)		3
AHSS 796	Special Topics (Emerging Trends in Teaching and Learning Online-Spring, annually)	
EDUC 728	Instructional Technology for Teaching and Learning (Fall 2017 (Normal rotation less than once per year))	
EDUC 753	Managing/ and Monitoring Learning (Spring, annually)	
EDUC 853	Instructional Methods for Adult Learners	
HDFS 880	Supervision and Teaching Couple and Family Therapy	
STEM 820	STEM Curriculum and Instruction (Spring, every even year (2018, 2020, 2022))	
STEM 840	Designing Technology-infused Learning Environments in Higher Education	
Required Teaching Practicum		3

EDUC 792 or EDUC 892	Specialized Studies for K-12 Teachers (*) Graduate Teaching Experience
Total Credits	
9	

*Refers to courses cross-listed to be taken under a prefix in the student's major field. For example, a HDFS major would take HDFS 892 and a COMM major would take COMM 792.

This experience requires a minimum of 15 face-to-face teaching hours, with the remaining credit hours to be dedicated to preparing lesson plans, evaluating student data, and developing assessments. The field experience will be designed in consultation with their department and a faculty teaching mentor.

Students will prepare a 2-page field experience proposal for approval from the CTC director during the semester prior to the experience to ensure the practicum meets CTC requirements.

Notes:

1. This schedule is subject to change.
2. Every course has an enrollment cap. Please check with the individual course instructors.
3. **Once requirements are completed a student must submit the** Verification of College Teaching Certificate (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Verification__CTC.pdf) **form.**

Communication

Department Information

- **Department Chair:**
Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
Zoltan Majdik, Ph.D.
- **Department Location:**
Minard Hall 338
- **Department Phone:**
(701) 231-7705
- **Department Web Site:**
www.ndsu.edu/communication/ (<http://www.ndsu.edu/communication/>)
- **Application Deadline:**
Ph.D - March 1; M.A. - March 15, October 15
- **Credential Offered:**
Ph.D., M.A.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibT 100, IELTS 7 for admission; TOEFL ibT 100, IELTS 7 for teaching assistantship

The graduate program in communication offers graduate study leading to the M.A. and Ph.D. degrees. The program prepares students for academic and management positions, as well as advancement within current career fields.

The department tailors student research projects and academic programs to individual needs and interests. Students may take interdisciplinary graduate course work to enhance their program of study. Information is available on the department's website, www.ndsu.edu/communication (<https://www.ndsu.edu/communication/>) .

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Arts

To be admitted with full status to the program, the applicant must meet the Graduate School requirements; have adequate study in communication, journalism or a related area; and provide a score for the Graduate Record Examination (GRE).

Doctor of Philosophy

To be admitted with full status to the program, the applicant must meet the Graduate School requirements. In addition to materials required by the Graduate School applicants must submit:

- A CV or resume which clearly identifies your current position, including your responsibilities, your professional publications and papers, your service and professional activity, and your teaching and training experiences.
- A scholarly writing sample where the candidate is first author (single authorship preferred), such as a master's thesis, proposal, or chapter, a conference paper, or a final course paper.
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) that speak to experience or potential of applicant, peer evaluations/observations, sample syllabi, sample lesson plan/assignment, etc.
- Graduate Record Exam (GRE) scores.
- TOEFL test results (required for international students).

Financial Assistance

Students admitted at full or conditional status will be considered for teaching assistantships at the master's or doctoral degree level, based on the strength of their application materials. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program.

Graduate assistants receive a stipend and tuition waiver.

Master's program

The Master of Arts program is designed for students who are interested in conducting quantitative, qualitative, or humanistic/rhetorical research. The program requires completion of 30 credit hours of graduate coursework with an overall GPA of 3.0 or better. The student can elect to complete a research-based thesis, for which six of the 30 credits are awarded, or a written exam, for which three credits are awarded. A prospectus meeting and final defense of the thesis/written exam is required.

Code	Title	Credits
Core		
COMM 700	Research Methods in Communication	3
COMM 711	Communication Theory	3
Research Tools		
Select at least two of the following:		6
COMM 704	Qualitative Research Methods in Communication	
COMM 707	Quantitative Research Methods in Communication	
COMM 767	Rhetorical Criticism	
SOC 700	Qualitative Methods	
SOC 701	Quantitative Methods	
STAT 725	Applied Statistics	
Elective Specialization		
12-15 credits of additional coursework, depending on whether the thesis or exam option is selected. Students can select from a wide range of specializations, pending approval from their adviser. Students may also choose graduate-level electives from other departments that may enhance specialized communication study goals.		12-15
Thesis or Exam		
The thesis option requires six credits of COMM 798. The exam option requires three credits of COMM 799.		3-6

Doctor of Philosophy

The Ph.D. program is designed to be completed in 4 years, and requires at least 60 credit hours beyond the master's degree. These hours will be in a planned course of study approved and overseen by the student's adviser and advisory committee.

The department currently offers two areas of concentration:

- Media/Technology and Society
- Organizational Communication

Students with a master's degree in another discipline may be required to complete additional graduate course work in specific areas of communication deemed necessary by the student's adviser and advisory committee. Graduate work taken beyond the master's degree may be judged applicable by

the advisory committee, but post-master's graduate credits beyond 9 semester hours will not count toward the 60 credit minimum required for the Ph.D.

Students are strongly encouraged to take all of the Summer Scholar courses.

Course Requirements

Minimum of 60 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 700	Research Methods in Communication	3
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3
COMM 711	Communication Theory	3
COMM 735 or 783	Media and Society or Org Comm Theory Course	3
Content Concentration		
Minimum of 12 credit hours in the department's 700-level courses in the student's major concentration area		12
Minimum of 9 credit hours in the department's 700-level courses in the student's minor concentration area		9
Research Methods Courses		
At least 12 credit hours exclusive of COMM 700, maximum of 6 credit hours of independent study		12
Dissertation		
At least 15 credit hours of dissertation credits		15

Comprehensive Exam

When coursework is nearly completed, the Director of Graduate Studies will consider the program of study and student's professional presentations and publications to determine readiness for the comprehensive exam process. Doctoral students will meet with their advisers to prepare for the comprehensive examination.

After completion of the written examination, the doctoral committee will evaluate the written work. If the committee deems the work to be acceptable, the advisor will schedule an oral examination in which the student will defend his or her exam.

Dissertation

Under the guidance of an adviser and advisory committee, doctoral candidates will submit and defend a dissertation prospectus and ultimately a completed dissertation.

Stephenson J. Beck, Ph.D.

University of Kansas, 2008

Research Interests: Group and Organizational Communication, Interaction Analysis, Communication Strategy

Ross F. Collins, Ph.D.

University of Cambridge, 1992

Research Interests: Media History, International Media

Elizabeth Crisp Crawford, Ph.D.

University of Tennessee, 2007

Research Interests: Visual Storytelling, Advertising Message Strategy, Advertising Education

Shuning Lu, Ph.D.

University of Texas at Austin, 2019

Research Interests: Mass Communication, Digital Journalism

Zoltan Majdik, Ph.D.

University of Southern California, 2008

Research Interests: Rhetoric, Computational Study of Language, Digital Humanities

Robert Mejia, Ph.D.

University of Illinois, 2012

Research Interests: Media and Cultural Studies, Political Economy of the Media, Technology Studies, Game Studies, Rhetoric of Health and Disease

Carrie Anne Platt, Ph.D.

University of Southern California, 2008

Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

Melissa A. Vosen Callens, Ph.D.

North Dakota State University, 2010

Research Interests: Online Pedagogy, Emerging Media and Classroom Technology, Representations of Race and Gender in Popular Culture

Justin A. Walden, Ph.D.

Pennsylvania State University, 2013

Research Interests: Organizational Communication, Organizational and Individual Technology Adoption, Employee/Brand Advocacy

Catherine Kingsley Westerman, Ph.D.

Michigan State University, 2008

Research Interests: Organizational Communication, Workplace Friendships

David Westerman, Ph.D.

Michigan State University, 2007

Research Interests: Computer Mediated Communication, Interpersonal Communication

Cheng Zeng, Ph.D.

University of Jyväskylä, Finland, 2018

Research Interests: Organizational Communication

Emeritus

Robert S. Littlefield, Ph.D.

University of Minnesota

Paul E. Nelson, Ph.D.

University of Minnesota

Judy C. Pearson, Ph.D.

Indiana University

Jerry Richardson, M.A.

University of Washington

Lou Richardson, M.A.

North Dakota State University

Community Development

Department Information

- **Program Coordinator:**
Christopher Whitsel, Ph.D.
 - **Email:**
christopher.whitsel@ndsu.edu
 - **Department Location:**
Minard 428
 - **Department Phone:**
(701) 231-7637
 - **Department Web Site:**
www.ndsu.edu/socanth/ (<http://www.ndsu.edu/socanth/>)
 - **Application Deadline:**
International application materials must be received before May 1 for the fall semester and prior to August 1 for spring and summer semesters. Domestic applications must be received at least one month prior to the start of the semester.
 - **Credential Offered:**
M.A., M.S.
 - **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6
-

Program Description

The Department of Sociology and Anthropology, in cooperation with the Department of Agribusiness and Applied Economics, offers a master's degree in Community Development. The degree is a multi-institutional, multi-disciplinary, online program in conjunction with the Great Plains Interactive Distance Education Alliance (IDEA). Other institutions participating in this program include Iowa State University, Kansas State University, the University of Nebraska-Lincoln, and South Dakota State University.

The primary audience for this program is community economic development officials and specialists already employed in the field.

The program requires a total of 36 credit hours, including 16 credits (six courses) of core courses, 15 credits in two of the four track areas, and up to six credits of thesis. The four track areas include Building Economic Capacity, Natural Resource Management, Working with Native Communities, and Non-profit Leadership.

Program Objectives

The objectives of the Community Development graduate degree program are to:

- Increase the skills, knowledge, and competencies of community economic development officials who are currently employed and have limited opportunity to participate in an on-campus degree program.
- Provide graduate training for individuals entering the community economic development career field who require training/degrees for career advancement.
- Enhance the community economic development skills, knowledge, and competencies of individuals working with Native American communities, natural resource-based communities, non-profit organizations, and/or state and local government.

A total of 36 credits are required for the master's degree program. Students will write a thesis or complete a creative component (Plan B) to capstone the degree program, which will be worth six credit hours. The student's schedule of courses must be approved by the faculty adviser and the campus coordinator. Students may select either a Master of Science (M.S.) or Master of Arts (M.A.) option. The M.A. option requirement normally includes two (2) years of a foreign language. This requirement can be satisfied with undergraduate courses and/or a proficiency examination.

Students will be required to take all of the six core courses and an additional 15 credits selected from at least two tracks.

There are presently four tracks that have been developed from which students may choose. These include:

- Building Economic Capacity
- Natural Resource Management
- Working with Native Communities
- Non-profit Leadership

Code	Title	Credits
Core Courses Credits		18
CED 709	Foundations in Community Development	
CED 711	Principles and Strategies of Community Change	
CED 713	Community Development II: Organizing for Community Change	
CED 715	Community Analysis: Introduction to Methods	
CED 717	Community and Regional Economic Policy and Analysis	
CED 719	Community Natural Resource Management	
Electives		12-18
CED 752	Basic Grant Development and Management	3
CED 721	Introduction to Native Community Development	3
CED 723	Building Native Community/Economic Capacity	3
CED 733	Sustainable Communities	3
CED 741	Economic Development Strategies and Programs	3
CED 745	Land Management Planning	3
CED 761	Government, Politics, & Community Development	3
CED 753	Not-for-profit Management	3
CED 755	Community Leadership and Capacity Building	3
CED 763	Immigrants and Communities	3
CED 758	Evaluation of Organizations and Programs	3
CED 756	Community Engagement	3
CED 746	HOUSING AND DEVELOPMENT PROGRAMS	3

Plan A or B option

CED 798 Master's Thesis
or CED 797

Plan C

The Plan C option requires 36 credits of coursework only.

Computer Science

Department Information

- **Department Chair:**
Simone Ludwig, Ph.D.
- **Graduate Coordinator:**
Saeed Salem, Ph.D.
- **Department Location:**
258 QBB
- **Department Phone:**
(701) 231-8562
- **Department Email:**
gradinfo@cs.ndsu.edu
- **Department Web Site:**
www.ndsu.edu/cs/ (<http://www.ndsu.edu/cs/>)
- **Application Deadline:**
February 1 for fall semester; September 1 for spring semester**
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Computer Science and Operations Research offers the Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) degrees in Computer Science. For additional information, see the Computer Science website (<https://www.ndsu.edu/cs/graduates/>) or contact the Computer Science Department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

**Spring admissions are given only occasionally, depending on funding and faculty interest. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester.*

In addition to the minimum Graduate School requirements, the following items are required for all Computer Science applicants seeking an advanced degree:

Master of Science

- The applicant must have a bachelor's degree from an educational institution of recognized standing. Admission to the program is competitive; the following minimum requirements are necessary but are not sufficient for automatic admission.
- The applicant must show, by a combination of educational background, academic performance, and work experience, the potential to succeed in advanced study and research in computer science. Minimum preparation usually includes the ability to program in one or more modern, commonly used high-level languages (such as Java or C++); and experience in using data structures such as linked lists and binary trees. Minimum preparation for unconditional admission to the master's program would normally include courses in computer science principles and theory equivalent to the NDSU courses.

Code	Title	Credits
CSCI 161	Computer Science II	4
CSCI 222	Discrete Mathematics	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3

- The applicant for the Computer Science M.S. degree program must have a cumulative grade point average (GPA) in all previous courses of at least 3.0 (out of 4.0) or equivalent to attain full standing.

- The applicant for the Computer Science M.S. degree program must have a score above the median (50th percentile) for the quantitative reasoning portion of the GRE exam.
- International students are welcome to apply. They must submit TOEFL, IELTS, or PTE Academic score. Minimum requirements are: TOEFL score of at least 550 (paper based) or 79 (internet based); IELTS score of at least 6.5; or PTE Academic score of at least 53.
- Eligibility for a teaching assistantship requires the following additional requirements: minimum TOEFL iBT score of 81 (IELTS of 7), a TOEFL iBT Speaking subscale score of 23 or above and a TOEFL iBT Writing subscale score of 21 or above. The IELTS equivalent scores are 6.0 and 6.0 respectively.
- These individuals must have a minimum TOEFL iBT score of 79 (IELTS of 6.5) and must score at or above the 40th percentile on the TOEFL iBT Speaking and Writing subscales (currently 19 and 21 respectively). The IELTS equivalent scores are 5.5 and 6.0 respectively.

Doctor of Philosophy

The applicant must have at least a four-year bachelor's degree, or a master's degree in computer science. In some cases, students with a degree in a closely related area may be considered, provided the course work includes exposure to the skills listed under M.S. above. Students with only a bachelor's degree should have substantial computer science experience, whether acquired through course work or professional experience.

Admission to the program is competitive, and requirements for admission to this program are more rigorous than for admission to the M.S. program. Students applying with a bachelor's degree only should meet a minimum GPA of 3.25 in previous coursework. The applicant for Computer Science Ph.D. degree program must have a GRE score above the median (50th percentile) for the quantitative reasoning portion. The admissions committee will evaluate the applicant's overall academic record, as well as any relevant employment and professional experience. Of particular importance is evidence of the applicant's potential for scholarship and independent research at the Ph.D. level. International students are welcome. English Language requirements are the same as for the Computer Science M.S. program.

The graduate admissions committee reviews all applications during the month following the application deadline and considers accepted students for any available assistantship positions within the department. If an assistantship is not offered at time of admission, accepted students can then fill out an application on the Computer Science website for later consideration.

Financial Assistance

Assistantships are available to selected graduate students. Teaching one section of a lower division service course requires 10 hours of work per week and qualifies the student for a waiver of graduate tuition and a monthly stipend. Other assistantships that provide a stipend and tuition waiver include research assistantships, which involve assisting faculty with their research, and graduate service assistantships, which involve tutoring, grading or computer-related work with faculty members or organizations on campus. Related prior experience increases the likelihood of a teaching or tutoring assistantship being awarded. For all assistantships, a student's chances are greater after they have been at NDSU one or two semesters.

Code	Title	Credits
Master of Science in Computer Science Degree Requirements		
Semester core courses (required of all students):		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 741	Algorithm Analysis	3
CSCI 765	Introduction To Database Systems	3
Additional 700-800 level Computer Science courses selected in consultation with your adviser.		
Thesis Option (Plan A)		32
CSCI 790	Graduate Seminar	2
Additional graduate coursework		8-12
CSCI 798	Master's Thesis	6-10
Comprehensive Study Option (Plan B)		32
CSCI 790	Graduate Seminar	1-3
Additional Graduate Coursework		14-16
CSCI 797	Master's Paper	2-4
Culminating Experience-Based Option (Plan C)		36
Additional Graduate Coursework		24

Students seeking an option in cybersecurity must take 9 credits from the below list.

Code	Title	Credits
Courses numbered CSCI 601-610		
and		

CSCI 669	Network Security
CSCI 773	Foundations of the Digital Enterprise

- Research adviser should be selected by the end of the second semester at NDSU.
- Additional 600-800 level Computer Science courses selected in consultation with your adviser.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- All course work must be approved by the student's adviser, Supervisory Committee, department chair, and graduate dean through the plan of study.
- A maximum of 9 semester credits may be transferred into the program. There may be a maximum of 3 credits of independent study.
- Comprehensive Examination (on the core courses), only for plan A and B, should be completed by the end of the fourth semester.
- Final Oral Examination on the student's research for plan A and B.

Code	Title	Credits
Bachelor's to Doctor of Philosophy in Computer Science		90
Core Courses: (or their equivalent in transfer or examination credits)		15
CSCI 713	Software Development Processes	
CSCI 724	Survey of Artificial Intelligence	
CSCI 741	Algorithm Analysis	
CSCI 765	Introduction To Database Systems	
CSCI 790	Graduate Seminar	
Additional courses (8-13) selected in consultation with your adviser.		24-39
Research		36-51
CSCI 899	Doctoral Dissertation	

Code	Title	Credits
Master's to Doctor of Philosophy in Computer Science		60
Core Courses: (or their equivalent in transfer or examination credits)		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 741	Algorithm Analysis	3
CSCI 765	Introduction To Database Systems	3
CSCI 790	Graduate Seminar	3
Additional courses (3-5) selected in consultation with your adviser.		9-15
CSCI 899	Doctoral Dissertation	30-36

Code	Title	Credits
Students seeking an option in cybersecurity must take 9 credits from the list below.		
Courses numbered CSCI 601-610		
and		
CSCI 669	Network Security	
CSCI 773	Foundations of the Digital Enterprise	

- Students who applied the listed core courses towards a M.S. degree obtained from NDSU can take up to 42 research credits.
- Research adviser should be selected by the second semester at NDSU.
- A Plan of Study listing coursework and supervisory committee members should be completed by the end of the second semester at NDSU.
- Satisfactory completion of the Comprehensive Exam at the Ph.D. level (written exam based on the core courses).
- Research proposal presentation and preliminary oral examination (Qualifying Exam) should be completed by the fourth semester at NDSU after passing the Comprehensive Exam.
- Final Oral Examination on the Ph.D. dissertation.

Zahid Anwar, Ph.D.

University of Illinois at Urbana-Champaign, 2008

Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Jun Kong, Ph.D.

University of Texas, Dallas, 2005

Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.

North Dakota State University, 2015

Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.

University of British Columbia, 2008

Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.

University of Texas San Antonio, 2017

Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.

Brunel University, 2004

Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.

Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.

University of Texas at Austin, 2014

Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.

North Dakota State University, 2009

Research Interests: Software Engineering

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009

Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.

University of North Dakota, 2015

Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.

University of California-Berkeley, 1971

Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.

Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Affiliate Faculty

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978

Research Interests: Data Science, Optimization, Cybersecurity, Smart Grid, Sensor Networks, Agents, Simulation, Artificial Intelligence, Adaptive Systems, Swarm Intelligence

Gursimran Walia, Ph.D.

Mississippi State University, 2009

Otto Borchert, Ph.D.

North Dakota State University, 2015

Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Computer Science Education

Department Information

- **Department Head:**
Simone Ludwig, Ph.D.
- **Graduate Coordinator:**
Saeed Salem, Ph.D.
- **Department Location:**
258 QBB
- **Department Phone:**
(701) 231-8562
- **Department Email:**
gradinfo@cs.ndsu.edu
- **Department Web Site:**
cs.ndsu.edu/ (<http://cs.ndsu.edu/>)
- **Credential Offered:**
Certificate
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

This certificate is primarily aimed at high school teachers in need of credentials to teach "dual credit" courses in their schools as well as AP Computer Science instructors. To meet the needs of the program the courses must be (1) online; (2) taught in the summer; and (3) taught in a condensed or hybrid format.

The graduate certificate in Computer Science Education is comprised of six 3-credit courses for a total requirement of eighteen credits, aimed at preparing for teaching high school CS. The certificate program will be offered online, all year long as courses are developed. The courses are selected for their content which covers the essential, core concepts of Computer Science, and how to teach them.

Program Objectives:

The Graduate Certificate Program in Computer Science Education will focus on the following:

1. Focus on fundamental topics providing a broad background in Computer Science.
2. Be flexible enough to allow students from varied backgrounds and different points in their working career to enter the program with a minimum of pre-requisite work.
3. Be flexible enough to allow students currently pursuing advanced degrees in computing related disciplines to join the program and readily add the Graduate Certificate to their credentials.
4. Provide the necessary 18 credit hours for high school teaching credentials while presenting a course offering schedule to allow students to complete the program in fifteen months.
5. Make maximum use of existing department resources at NDSU to support delivery of the program.
6. Gain a broad background and knowledge in Computer Science Education through a fixed set of core courses.

Certificate Requirements

Course requirements may be found on the Computer Science department website (<https://www.ndsu.edu/cs/graduates/>).

Construction Management and Engineering

Department Information

- **Department Chair:**
David Steward, Ph.D.
- **Graduate Coordinator:**
Huojun Yang, Ph.D.
- **Department Location:**
Engineering 106
- **Department Phone:**

(701) 231-6202

- **Department Web Site:**
www.ndsu.edu/construction/ (<http://www.ndsu.edu/construction/>)
- **Application Deadline:**
Fall: May 1; Spring: October 1 for M.S. and Master of Construction Management, November 1 for Certificate
- **Credential Offered:**
MSCM, MCM, CCM
- **Test Requirement:**
GRE (M.S. applicants)
- **English Proficiency Requirements:**
M.S.: TOEFL iBT: 81, IELTS: 7, PTE Academic 54; Master of Construction Management: TOEFL iBT: 79, IELTS: 6.5, PTE Academic: 53

Programs

The Department of Construction Management and Engineering offers three separate and distinct graduate programs as listed below.

Master of Science in Construction Management (MSCM)

The Master of Science in Construction Management program is an on-campus, research-focused degree. The program consists of a total of 31 credits (24 credits of course work, 6 credits of research/thesis, and 1 credit of seminar). Students are expected to significantly contribute to the development and delivery of scholarly publications and to the development and submission of research grant proposals as determined by the major adviser.

Master of Construction Management (MCM)

The Master of Construction Management program is a 100% online professional program consisting of 30 credits of course work (10 courses offered within a 12 month period) and the Associate Constructor (AC) Exam. The program provides a learning experience constituting a distinct knowledge-base and a specific set of associated skills within the areas of construction estimating, scheduling, project management, finance, safety and quality, and techniques and equipment at the professional level.

Graduate Certificate in Construction Management (CCM)

The Graduate Certificate in Construction Management program provides a 100% online program consisting of 9 credits of course work (3 courses offered within a 12 month period) within the areas of estimating, scheduling, and project management at the professional level. These three areas constitute a body of knowledge that represents the fundamental core of construction management.

Master of Science in Construction Management (MSCM)

In addition to the Graduate School requirements, to be admitted into the Master of Science in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing.
- Submit an official transcript for each college/university attended.
- Submit Graduate Record Examination (GRE) score.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Master of Science in Construction Management, emphasizing on research objectives and qualifications that directly relate to one or more of the "Research Interests" of the CM&E faculty.
- Submit a two-page resume.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

For exceptional applicants, the CM&E Department may offer a graduate assistantship, which consists of a monetary stipend and a possible tuition waiver; however, student activity fees and program fees are not waived. There is no separate application process for graduate assistantships. Applicants are evaluated based on their credentials and/or experience.

Master of Construction Management (MCM)

In addition to the Graduate School requirements, to be admitted into the Master of Construction Management, applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 3.0 or equivalent to attain full standing. Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Submit an official transcript for each college/university attended.

- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Master of Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process. Applicants who are deficient in the CGPA requirement are encouraged to apply for the Graduate Certificate in Construction Management. Although successful completion of the Graduate Certificate does not guarantee acceptance into the Master of Construction Management, the Graduate Certificate will be seriously considered in application decisions related to the Master of Construction Management Program.

Financial Assistance

Graduates students in the Master of Construction Management program are not eligible for assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU.

Graduate Certificate in Construction Management (CCM)

In addition to the Graduate School requirements, to be admitted into the Graduate Certificate in Construction Management applicants must:

- Have earned a baccalaureate degree in construction, engineering, architecture, or other related discipline with a minimum CGPA of 2.75 or equivalent to attain full standing. Work experience in the construction industry can possibly be a substitute if degree is in another field.
- Submit of an official transcript for each college/university attended.
- Submit a two-page resume.
- Submit a one-page "Statement of Purpose" outlining reasons for pursuing the Graduate Certificate in Construction Management.
- Submit three (3) letters of recommendation.

Prospective students must submit application materials directly to the NDSU Graduate School via the online application process.

Financial Assistance

Graduate Certificate in Construction Management Program students are not eligible for assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU.

Master of Science in Construction Management (MSCM)

The Master of Science in Construction Management requires a total of 31 graduate-level credits (24 credits of course work, 6 credits of research/thesis, and 1 credit of seminar) and a thesis. The thesis requires the creation and presentation of new knowledge in providing a solution to a problem. Prior to submitting a thesis to the graduate student's supervisory committee, the thesis must be reviewed by a departmentally approved external editor. All costs associated with external review are the responsibility of the graduate student.

An example of the Plan of Study for the Master of Science in Construction Management is shown below:

Code	Title	Credits
CM&E 790	Graduate Seminar	1
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 701	Construction Technology and Equipment	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
600, 700 or 800-level electives *		9
CM&E 798	Master's Thesis	6
Total Credits		31

* Electives may be any 600, 700, or 800-level courses offered at NDSU determined by the student and the major faculty adviser. A minimum cumulative grade point average (CGPA) of 3.0 must be achieved in order to complete the M.S. degree.

Master of Construction Management (MCM)

The Master of Construction Management degree consists of thirty (30) credits of course work and AC Exam. The following ten (10) courses constitute the thirty (30) credits of course work required for the degree.

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 605	Construction Support Operations	3
CM&E 660	Infrastructure Management	3
CM&E 701	Construction Technology and Equipment	3
CM&E 703	Advanced Project Planning and Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3
CM&E 715	Construction Specifications and Contracts	3
CM&E 725	Decision Making and Risk Analysis	3
CM&E 740	Financial and Economic Concepts for Construction Managers	3
CM&E 793	Individual Study/Tutorial (ACExam)	

Total Credits		30
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Schedule of Courses

Summer Semester

CM&E 603 Scheduling and Project Control
 CM&E 660 Infrastructure Management

Fall Semester

CM&E 703 Advanced Project Planning and Control
 CM&E 712 Construction Management
 CM&E 715 Construction Specifications and Contracts
 CM&E 740 Financial and Economic Concepts for Construction Managers

Spring Semester

CM&E 605 Construction Support Operations
 CM&E 701 Construction Technology and Equipment
 CM&E 711 Construction Cost Estimating
 CM&E 725 Decision Making and Risk Analysis

Associate Constructor (AC) Exam

The Associate Constructor (AC) Exam is administered by the American Institute of Constructors & Constructor Certification Commission. All students in the Master of Construction Management Program must take the AC Exam before their graduation. There is no requirement that a student has to earn a pass score in order to receive the Master of Construction Management Degree from NDSU. However, students are encouraged to prepare for the AC Exam and earn a pass score or better established by the testing agency. The exam may be taken multiple times. The AC exam is the first level in reaching the designation of a "Certified Professional Constructor" (CPC), which is a three-stage process consisting of the AC exam (Level I), 4-5 years of relevant construction management work experience, and the CPC exam (Level II). The AC Exam is offered twice a year, typically in April and November. International applicants should note that the AC Exam is not offered online and is only offered in the United States. If a student has the AC designation, he/she may take the CPC Exam before the graduation. A pass score also is not required for the CPC Exam.

Graduate Certificate in Construction Management (CCM)

The certificate program consists of nine credits encompassing the following three (3) courses:

Code	Title	Credits
CM&E 603	Scheduling and Project Control	3
CM&E 711	Construction Cost Estimating	3
CM&E 712	Construction Management	3

Only grades of C or higher will satisfy requirements for certificate completion with a CGPA of 3.0 or greater. The Dean of the Graduate School, using official NDSU transcripts, will verify course completion and issue the certificate. Courses used to satisfy the Graduate Certificate requirements cannot be older than three years at the time the certificate completion is verified.

Eric Asa, Ph.D.

Associate Professor
 University of Alberta, 2002

Research Interests: Infrastructure and Assets Management, Construction Materials, Engineering Education, Computational Modeling

Abdul-Aziz Banawi, Ph.D.

Assistant Professor

University of Pittsburgh, 2013

Research Interests: Life Cycle Assessment, Building Information Modeling, Building Construction - Virtual Reality, Green Buildings and Sustainability, Lean Construction and Six-Sigma

Zhili (Jerry) Gao, Ph.D., P.E., C.P.C

Associate Professor and Department Chair

Iowa State University, 2004

Research Interests: Lean Construction, Virtual Design and Construction (Visualization, BIM Development and Implantation), Advanced Concrete Techniques (Sustainable Concrete, New Concrete Materials And Structures)

Todd L. Sirotiak, MBA, Ph.D., P.E., C.P.C.

Associate Professor

Iowa State University, 2008

Research Areas: Cost Control, Sustainability, and Engineering Education

Huojun Yang, Ph.D.

Assistant Professor and Graduate Program Coordinator

University of Nebraska-Lincoln, 2012

Research Interest: Built Environmental Systems, Smart Buildings, Building Energy Efficiency, Renewable Energy, and Thermophysical properties measurement of porous materials

Yao Yu, Ph.D.

Assistant Professor

North Carolina A&T State University, 2014

Research Areas: Building Energy Conservation Technology, Computational Airflow Modeling, and HVAC System Design and Simulation

Counselor Education

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Graduate Coordinator:**
Jodi Tangen, Ph.D.
- **Department Location:**
SGC Building, 1919 N. University Drive
- **Department Phone:**
(701) 231-7202
- **Department Web Site:**
www.ndsu.edu/ceduc/ (<http://www.ndsu.edu/ceduc/>)
- **Application Deadline:**
February 1
- **Credential Offered:**
M.Ed., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Counselor Education Program offers graduate study leading to a Master's of Education (M.Ed.) or a Master's of Science (M.S.) in Counselor Education. Accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), the Counselor Education program prepares counselors to work professionally with persons from diverse cultural backgrounds in a variety of settings. Program specializations are available in School Counseling and in Clinical Mental Health Counseling.

The Counselor Education Program welcomes applications from all persons who meet the entrance requirements and highly encourages members of culturally-diverse groups to apply.

All applications for the program are due February 1st. Applications received after February 1st are reviewed on a space-available basis. The requirements for full standing admission include:

- A completed application
- A minimum undergraduate cumulative GPA of 3.0 on a 4.0 scale, or a minimum GPA of 3.0 on 10 semester credits of graduate coursework*
- Personal and professional references
- A detailed statement of purpose

Applications can be obtained online at <https://www.ndsu.edu/gradschool/apply> (<https://www.ndsu.edu/gradschool/apply/>)

*In rare cases, if an applicant does not meet the 3.0 GPA guideline set above, but has between a 2.5 and 3.0 GPA, faculty may consider her or him for conditional acceptance into the program. In this situation, the applicant must include in the application materials a separate letter explaining the circumstances related to the lower GPA and defining specific measures taken to prepare for current academic success. If faculty members determine the prospective student shows potential as evidenced by her or his application materials, they will invite her or him for an interview. If accepted following the interview, she or he receives a conditional acceptance.

Students in conditional standing must then receive a GPA of 3.5 or better for the first 9 semester credit hours, meet disposition requirements, and meet any other conditions set by the Counselor Education faculty. Upon review of the faculty, conditionally accepted students who meet the criteria above receive acceptance; those who do not meet the criteria above will not be permitted to continue in the program.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Counselor Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

The Counselor Education program does not credential, license, or certify graduates. However, our program meets counseling educational standards and prepares students to meet credentialing, licensure, and/or certification requirements. Students who plan to work outside of North Dakota should discuss their plans with their advisors and review these out-of-state requirements.

Master of Education (M.Ed.)

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 712	Counseling Across the Lifespan	3
CNED 713	Assessment Techniques	3
CNED 714	Career Counseling and Testing	3
CNED 715	Professional Orientation and Ethics	3
CNED 716	Social and Cultural Foundations of Counseling	3
CNED 720	Group Counseling	3
CNED 732	Family Counseling	3
CNED 734	Dynamics of Addiction	3
CNED 731	Counseling Children and Adolescents	3
CNED 794	Practicum/Internship (Practicum)	3
CNED 794	Practicum/Internship (Internship)	6-9
Specialization Programs		
Clinical Mental Health Counseling Program		
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 890	Graduate Seminar	3
Elective (if doing 6 credits of internship)		3
Clinical Mental Health Counseling Total Credits		60

School Counseling		
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
Electives/Teacher Education Courses		6 (9 if doing 6 credits of internship)
School Counseling Total Credits		60

Master of Science

School Counseling Specialization

Code	Title	Credits
I. Human Growth and Development		
CNED 712	Counseling Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
II. Social and Cultural Foundations		
CNED 716	Social and Cultural Foundtions of Counseling	3
III. Helping Relationships		
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3
IV. Groups		
CNED 720	Group Counseling	3
V. Career & Lifestyle Development		
CNED 714	Career Counseling and Testing	3
VI. Appraisal		
CNED 713	Assessment Techniques	3
VII. Research & Program Evaluation		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 797	Master's Paper (OR)	3
CNED 798	Master's Thesis	6
VIII. Professional Orientation		
CNED 715	Professional Orientation and Ethics	3
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
IX. Practicum		
CNED 794	Practicum/Internship	3
X. Internship		
CNED 794	Practicum/Internship	4
XI. Electives (approved by adviser)		
Total Required Credits		48

Clinical Mental Health Counseling

Code	Title	Credits
CNED 712	Counseling Across the Lifespan	3
CNED 734	Dynamics of Addiction	3
CNED 716	Social and Cultural Foundtions of Counseling	3
CNED 710	Counseling Techniques	3
CNED 711	Counseling Theory	3
CNED 732	Family Counseling	3

CNED 720	Group Counseling	3
CNED 714	Career Counseling and Testing	3
CNED 713	Assessment Techniques	3
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 731	Counseling Children and Adolescents	3
CNED 715	Professional Orientation and Ethics	3
CNED 794	Practicum/Internship	3
CNED 794	Practicum/Internship	6
CNED 798	Master's Thesis	3
Clinical Mental Health Counseling Program		
CNED 730	Crisis and Trauma in Counseling Practice	3
CNED 723	Psychopathology and Diagnosis for Counselors	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 890	Graduate Seminar	3
School Counseling Program		
CNED 728	Guidance Administration and Consulting	3
CNED 729	Professional K-12 School Counseling	3
Electives/Teacher Education Courses		6
Total Required Credits		60

Carol E. Buchholz Holland, Ph.D.

Kansas State University, 2005

Research Interests: School Counseling; Solution Focused Counseling Approaches

Jessica Danielson, Ph.D., LPCC-S, NCC

North Dakota State University, 2017

Research Interests: Female Partner Family Formation, Creative Pedagogy in Counselor Education and Supervision, Marginalized Counselor Identities, Power and Privilege in Academia, and Feminist Issues

Brenda Hall, Ed.D., Emeritus Faculty

Virginia Polytechnic Institute and State University, 1993

Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

James Korcuska, Ph.D.

Kent State University, 2000

Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC

Kent State University, 2002

Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating these issues.

Jill Nelson, Ph.D.

Kent State University, 2005

Research Interests: Shame and Shame Resilience, Mentoring, Community Well-Being Interventions, and Women's Issues in Higher Education

Jodi L. Tangen, Ph.D., NCC

University of North Carolina at Greensboro, 2015

Research Interests: Spirituality/Religion in Counseling, Existential and Jungian Theories, Multicultural and Feminist Theory and Practice, Clinical Supervision, and Relational Depth

Counselor Education and Supervision

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Graduate Coordinator:**
Jodi Tangen, Ph.D.
- **Department Location:**

SGC Building, 1919 N. University Drive

- **Department Phone:**
(701) 231-702-02
- **Department Web Site:**
www.ndsu.edu/ceduc/ (<http://www.ndsu.edu/ceduc/>)
- **Application Deadline:**
February 1 for fall admission
- **Credential Offered:**
Ph.D.

Program Description

The Counselor Education Program offers graduate study leading to a Doctor of Philosophy (Ph.D.) in Counselor Education and Supervision. The doctoral program in Counselor Education and Supervision is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP), which ensures the highest educational standards are met. Graduates of our programs are trained to be leaders in teaching, clinical supervision, counseling practice, research, and advocacy. The culture of the doctoral program is highly relational and individualized to meet diverse students' needs. Faculty members admit a small number of students each year, so that we may build strong relationships with students and support their educational aspirations. The counselor education faculty members have a wide variety of theoretical orientations and areas of expertise.

The Counselor Education Program welcomes applications from all persons who meet the entrance requirements and highly encourages members of culturally-diverse groups to apply.

The application deadline is February 1st of each year for admission the following fall semester. Students are admitted once per year.

Required documents for graduate admission application for the NDSU Counselor Education and Supervision doctoral program include:

- A completed application (including official transcripts from all colleges/universities where coursework was completed)
- Curriculum vitae or resume
- Personal and professional references
- A detailed statement of purpose

Applications can be obtained online at <https://www.ndsu.edu/gradschool/apply> (<https://www.ndsu.edu/gradschool/apply/>)

Admission Criteria

In order to be considered for admission to the program, applicants must:

- Meet graduate school minimum requirements for admission and have evidence of academic aptitude for doctoral-level study.
- Have a master's degree in counseling, or a closely related field that closely aligns with CACREP standards. Graduates from CACREP-accredited programs receive preference. Students with master's degrees from non-CACREP accredited programs may be considered, but they must meet all CACREP requirements for a master's degree prior to taking related core doctoral classes.
- Previous professional experience.
- Show evidence of fitness for the counseling profession, including self-awareness and emotional stability during interactions with faculty and other students that occur in the interview process.
- Show evidence of excellent oral and written communication skills, and professional potential by submitting a statement of purpose essay. The applicant's statement of purpose should address: (1) goals for obtaining a doctoral degree, (2) professional experience, (3) research interests, and (4) potential for scholarship, professional leadership, and advocacy.
- Show evidence of cultural sensitivity and awareness.
- Understand and comply with the American Counseling Code of Ethics or ASCA ethical standards where appropriate).
- Sign a disclosure statement regarding activities which may be deemed inappropriate by professional and/or ethical standards.
- Complete all international student requirements, where appropriate.

Financial Assistance

Limited graduate assistantships are available in the School of Education and on campus. We do not guarantee students an assistantship, but will alert students when we are aware of opportunities and support them in securing an appropriate assistantship. Students must be accepted into the Graduate School before they are eligible for an assistantship.

The doctoral degree in Counselor Education and Supervision requires a minimum of 60 semester credits beyond the master's degree. Students must successfully complete required courses, electives, a 600 hour doctoral internship, comprehensive exams and a disquisition.

Code	Title	Credits
Required Courses		
EDUC 703	Research, Measurement and Program Evaluation	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	3
CNED 867	Advanced Group Counseling	3
CNED 869	Instructional Theory and Practice in Counselor Education and Supervision	3
CNED 870	Counselor Supervision	3
CNED 871	Advanced Multicultural Practice in Counselor Education and Supervision	3
CNED 872	Advanced Counseling Theories	3
CNED 876	Qualitative Research and Program Evaluation	3
CNED 879	Quantitative and Survey Research	3
CNED 887	Professional Issues: Professional Development, Consultation and Publishing	3
CNED 880	Ethical and Legal Issues in Counselor Education and Supervision	3
CNED 890	Graduate Seminar	1-5
CNED 894	Practicum/Internship	1-8
CNED 899	Doctoral Dissertation	1-15
Statistics		
STAT 725	Applied Statistics	3
Additional Statistics Course		3

Additional Electives are also required, a minimum of 71 credits is required to graduate.

Carol E. Buchholz Holland, Ph.D.

Kansas State University, 2005

Research Interests: School Counseling, Solution Focused Counseling Approaches

Jessica Danielson, Ph.D., LPCC-S, NCC

North Dakota State University, 2017

Research Interests: Female Partner Family Formation, Creative Pedagogy in Counselor Education and Supervision, Marginalized Counselor Identities, Power and Privilege in Academia, and Feminist Issues

Brenda Hall, Ed.D., Emeritus Faculty

Virginia Polytechnic Institute and State University, 1993

Research Interests: Intimate Partner Violence, Relational Cultural Theory, and Collaborative Group Practices Studies

James Korcuska, Ph.D.

Kent State University, 2000

Research Interests: Counseling Research Methodology, Counselor Education, Men's and Gender Studies & Substance Abuse Counseling

Todd F. Lewis, Ph.D., LPC, NCC

Kent State University, 2002

Research interests: Risk Factors for Drinking during Emerging Adulthood, Theoretical Explanations for College Drinking and Substance Abuse, Substance Abuse Interventions, Motivational Interviewing, Process Addictions, and Quantitative Methods for Investigating These Issues.

Jill Nelson, Ph.D.

Kent State University, 2005

Research Interests: Shame and Shame Resilience, Mentoring, Community Well-Being Interventions, and Women's Issues in Higher Education.

Jodi L. Tangen, Ph.D.

The University of North Carolina at Greensboro, 2015

Research Interests: Spirituality/Religion in Counseling, Existential and Jungian Theories, Multicultural and Feminist Theory and Practice, Clinical Supervision, and Relational Depth

Criminal Justice

Department Information

- **Department Chair:**
Carol Archbold, Ph.D.
- **Graduate Coordinator:**
Andrew J. Myers, Ph.D.

- **Department Location:**
104 Putnam Hall
- **Department Phone:**
(701) 231-8567
- **Department Web Site:**
www.ndsu.edu/criminaljustice/ (<http://www.ndsu.edu/criminaljustice/>)
- **Application Deadline:**
April 1 for Ph.D. applicants, Master's applications accepted for fall and spring enrollments on a rolling basis.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 100, IELTS 7; to qualify for assistantship TOEFL iBT 114, IELTS 8

Program Description

The Department of Criminal Justice offers graduate study leading to both a MS and a Ph.D. degree in Criminal Justice. The MS degree has two tracks; Applied Criminal Justice and Criminology. The program in Criminal Justice is designed to enhance student's skills in understanding, gathering, processing, and analyzing research in the areas of criminology and criminal justice. The program is geared to understanding, critiquing, and analyzing the causes of crime and the criminal justice system's responses to it. The curriculum consists of foundation courses in theory, policy, and research methods, plus three substantive areas: 1) criminology, 2) policing, and 3) corrections. Students have their choice of specializing in one of the three. Students also will be afforded course work in learning how to teach a college course.

Graduates will find an expanding and terrific academic job market available as well as professional employment in the criminal justice policy and research sector. There are currently fewer than 40 Criminal Justice Ph.D. programs operating on a national level, so students graduating with a Criminal Justice Ph.D. will be competitive for the 350 positions available annually in academic units.

Ph.D. in Criminal Justice

Students should enter the program with an approved master's degree. Students will be required to have had one course in research methods and one course in statistics. Plus, students should have adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice.

Students will be required to take the Graduate Record Examination (GRE) and submit their undergraduate and graduate transcripts. For admission to full standing, students are required to attain a combined minimum score on the GRE of 1,000 (verbal and quantitative) (old scoring) or 300 (new scoring) and achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students not meeting these standards will be evaluated and possibly admitted on conditional status.

A student entering the program with a master's degree would take a minimum of 60 credit hours. Students entering the program with a master's degree should submit their research thesis to the graduate committee for review. This committee would be charged with determining whether the research project is sufficient in scope and depth to warrant further supervised research.

MS Degree in Criminal Justice

Students will need to enter the program with a baccalaureate degree. Students will be required to have had one course in research methods, one course in statistics, and should document adequate background preparation or demonstrated potential in the field of Criminology or Criminal Justice. For admission to full-standing, students are required to achieve a minimum grade point average of 3.0 over their last 60 credit hours. Students will be required to take the Graduate Record Examination (GRE) and submit all scores to the Graduate School.

Accelerated Master's Degree in Criminal Justice

The Accelerated Master's program allows exceptional undergraduate criminal justice students to complete their Master's degree in three semesters beyond the Bachelor's degree.

ADMISSION PROCESS: Upon completion of 60 undergraduate credit hours, eligible Criminal Justice majors can apply to the Accelerated Master's program. A minimum GPA of 3.5 for the Criminal Justice major, an overall cumulative GPA of 3.5, and successful completion of CJ 325 (Applied Research Methods) is required prior to admission to the program. Students may apply while enrolled in CJ 325, but must earn a minimum grade of "B" prior to beginning graduate coursework. Interested students may apply by completing an application on the NDSU graduate school website (www.ndsu.edu/graduateschool), requesting at least two letters of recommendation from faculty or instructors, and submitting a statement of intent explaining why the applicant wants to pursue a Master's degree in Criminal Justice. Interested students should apply early in the criminal justice program as credits from completed 400 level courses cannot be retroactively applied to the Accelerated Master's program.

COURSES: Once admitted to the Accelerated Master's program, students will take four 400/600 level courses (CJ 606 Crime and Delinquency; CJ 607 Deviant Behavior; CJ 660 Criminal Court System, and CJ 661 Corrections) to fulfill the requirements for their Bachelor's degree in Criminal Justice and

also receiving credit toward a Master's degree in Criminal Justice. Students enrolling in these courses at the 600 level can expect additional reading and writing beyond expectations for students completing these courses for 400 level credit. Students are required to earn a minimum of a "B" in order for the course to count toward the Master's degree. Failing to earn a "B" in any of the 400/600 cross-listed courses will be allowed one "re-take" of that course. Students receiving anything below a "B" in a retaking of a 400/600 level course will be removed from the program and will not be allowed to re-apply for admission into the Accelerated program or the traditional Master's program. Transfer credits from courses completed at other universities are not accepted for the Accelerated Master's program. Upon successful completion of the requirements for a baccalaureate degree, students will begin taking 700 level graduate courses.

Ph.D. in Criminal Justice

Students admitted to the doctoral program who have earned a master's degree in criminal justice/criminology will be given credit for their master's degree (up to 30 credits) and must take a minimum of 60 credits at NDSU. The amount of credit for the master's degree will be determined by the graduate coordinator.

Students entering with a master's degree that is not related to criminal justice/criminology must have a total must complete 90 credits post-baccalaureate.

Code	Title	Credits
Required Courses		
Theory/Policy		9
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills (at least 9 of these credits must be completed at NDSU)		15
CJ 702	Program Evaluation	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
STAT 726	Applied Regression and Analysis of Variance	
Substantive Areas (Students must complete four courses in a substantive area of choice. Additionally, students must complete one course in each of their non-substantive areas.)		18
Criminology		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
CJ 750	Violence	
CJ 752	Crime and the Life Course	
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
**Electives/Independent Study (Students should consult with their advisor as to other potentially appropriate electives. Below are example courses.)		15
CJ 768	Gender and Justice	
CJ 793	Individual Study	
PSYC 640	Experimental Methods	
PSYC 670	Experimental Social Psychology	
SOC 700	Qualitative Methods	
STAT 660	Applied Survey Sampling	

STAT 665	Meta-Analysis Methods	
CJ 899	Doctoral Dissertation	12
Total Credits		60-90

** 36 credits for for students entering the program with a master's degree that is not related to criminal justice/criminology

MS Degree in Criminal Justice

Students will need to declare their choice of a Track by the end of their first semester in the program.

Code	Title	Credits
Foundation Courses (Required for both tracks.)		18
CJ 702	Program Evaluation	
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
CJ 734	Advanced Criminal Justice Methods	
CJ 759	Advanced Research Design in Criminal Justice	
STAT 725	Applied Statistics	
Applied Track (in addition to the foundation courses students must complete one course from these areas.)		6
Corrections		
CJ 707	Juvenile Corrections	
CJ 733	Issues in Institutional Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
Policing		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
CJ 765	Classics in Policing	
Criminology Track (in addition to the foundation courses students must complete one course from the Theory area and Elective area)		6
Theory		
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
Electives		
CJ 606	Crime and Delinquency	
CJ 607	Deviant Behavior	
CJ 752	Crime and the Life Course	
CJ 768	Gender and Justice	
CJ 750	Violence	
Thesis or Policy Paper/Indep. Studies		6
CJ 798	Master's Thesis (or CJ 797 or CJ 793)	
Total Credits		30

Carol Archbold, Ph.D.

University of Nebraska-Omaha, 2002

Research Interests: Policing, Race and Gender in the Criminal Justice System, Qualitative Research Methods

Jeffrey Bumgarner, Ph.D.

University of Minnesota, 2000

Research Interests: Policing, Federal Law Enforcement, Federal Crime Policy, and Criminal Justice Administration

Andrew Myer, Ph.D.

University of Cincinnati, 2010

Research Interests: Effective Correctional Interventions, Evidence Based Program Evaluation, Actuarial Offender Risk Assessment Practices, and Macro-Social Research Methods

Amy J. Stichman, Ph.D.

University of Cincinnati, 2003

Research Interests: Corrections, Institutional Life, Inmate and Correctional Officer Attitudes, Treatment Program Evaluation, Gender Issues

Kevin M. Thompson, Ph.D.

University of Arizona, 1986

Research Interests: Delinquency, Quantitative Methods, Alcohol and Drugs, Juvenile Drug Courts

Cybersecurity Certificate

The need for Cybersecurity professionals is rapidly growing. Nearly every government, military, financial institution, medical establishment, and viable businesses collect, process, and store confidential information in databases. Cyber-attacks and digital spying can take many forms, including high visibility and very damaging offenses such as data breaches, phishing, and identity theft. Attacks can take place within databases, while data is processed, or when it is transmitted across networks. In the world of today, cyber-attacks may be a greater threat than terrorism.

The Graduate Certificate Program in Cybersecurity delivered cooperatively among North Dakota State University (NDSU), the University of North Dakota (UND), and Minot State University (MSU). Regardless of their home campus, enrolled students will take fully online courses from all three institutions. Students will learn best practices, new technology, and research in Cybersecurity.

Completion of the Graduate Certificate in Cybersecurity requires completion of 12 graduate credits. This includes three required courses, taken at NDSU, as well as one elective course which can be taken at NDSU or through a partnership with the University of North Dakota or Minot State University. Please contact the cybersecurity program coordinator regarding course options at UND and Minot State, as prospective courses will be individually approved.

Code	Title	Credits
Required Courses		
CSCI 603	Defensive Network Security	3
CSCI 604	Ethical Hacking	3
CSCI 610	Computer Crime and Forensics	3
Required Elective: Select 3 credits from the list below.		3
CSCI 609	Cybersecurity Law and Policy	
CSCI 669	Network Security	
CSCI 773	Foundations of the Digital Enterprise	
CSCI 774	Topics of the Digital Enterprise	
CSCI 783	Topics In Software Systems (cybersecurity focus)	
Total Credits		12

Students can request consideration of other courses for the required elective by contacting the cybersecurity program coordinator.

Zahid Anwar, Ph.D.

University of Illinois at Urbana-Champaign, 2008

Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Jun Kong, Ph.D.

University of Texas, Dallas, 2005

Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.

North Dakota State University, 2015

Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.

University of British Columbia, 2008

Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.

University of Texas San Antonio, 2017

Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.

Brunel University, 2004

Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.

Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.

University of Texas at Austin, 2014

Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.

North Dakota State University, 2009

Research Interests: Software Engineering

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009

Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.

University of North Dakota, 2015

Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.

University of California-Berkeley, 1971

Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.

Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Affiliate Faculty

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978

Research Interests: Data Science, Optimization, Cybersecurity, Smart Grid, Sensor Networks, Agents, Simulation, Artificial Intelligence, Adaptive Systems, Swarm Intelligence

Gursimran Walia, Ph.D.

Mississippi State University, 2009

Otto Borchert, Ph.D.

North Dakota State University, 2015

Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Developmental Science

Department Information

- **Department Head:**
Joel Hektner, Ph.D.
- **Graduate Coordinator:**
Elizabeth Blodgett Salafia, Ph.D.
- **Email:**
elizabeth.salafia@ndsu.edu
- **Department Location:**
Evelyn Morrow Lebedeff Hall

- **Department Phone:**
(701) 231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/graduate_studies/ds/ (http://www.ndsu.edu/hdfs/graduate_studies/ds/)
- **Application Deadline:**
February 1
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Developmental Science is an emerging approach to the study of human development that combines elements of more traditional approaches from the fields of Developmental Psychology and Human Development. Developmental Science entails the study of human development across the lifespan, integrating the biological, cognitive, and socioemotional underpinnings of development, and incorporating the familial, social, institutional and cultural contexts in which development occurs.

- Cumulative GPA of 3.0 or higher
- Statement of purpose should be 500 words or less and address the following:
 - How your interest in this field developed
 - Why you chose our program at NDSU
 - The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals
 - What your research interests are and how they might fit with the current research emphases in the department. If you have questions about this, the HDFS faculty research interests are described on the HDFS website (<http://www.ndsu.edu/hdfs/>) (<http://www.ndsu.edu/hdfs/>).
 - What your professional goals are and how this graduate program will help you accomplish your professional goals
- Curriculum vitae or resume
- Thesis or writing sample
- Submission of GRE Scores is optional. Lack of scores will not affect admissions decision.
- For non-native English speakers, TOEFL iBT score of at least 100 or IELTS score of at least 7
- Subscores on the TOEFL iBT are at least 24 for speaking and 21 for writing

For those entering with a Master's degree:

- Master's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area
- At least one course in statistics and one course in research methods, with a grade of B or higher
- Completion of an empirical Master's thesis

For those entering with a Bachelor's degree:

- Bachelor's degree from accredited educational institution in child development, developmental psychology, human development, developmental science, or related area

Financial Assistance

All admitted students are awarded graduate assistantships, which provide a full tuition waiver plus a stipend.

Curriculum for students entering with a Bachelor's degree (90 credits total)

- Students earn a Master's degree after completing 30 credits, master's oral examination and the master's thesis.
- All courses 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		12
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	

HDFS 815	Physical and Cognitive Development Across the Lifespan	
HDFS 817	Prevention Science	
Teaching Core		6
HDFS 892	Graduate Teaching Experience	
Choose one:		
HDFS 802	Teaching Developmental Science	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
STEM 810	Teaching College Science	
Methodology and Statistics Core		10
HDFS 705	Quantitative Methods in Developmental Science (4 credits)	
HDFS 856	Longitudinal Research Methods and Analysis	
One additional course in quantitative methods approved by adviser and committee or program coordinator		
Electives		15
Must include 9 credits in didactic 700- or 800-level courses (in HDFS or other departments) (HDFS 824 or HDFS 825 recommended)		
Can include, distributed in varying credit amounts across multiple semesters:		
HDFS 893	Individual Study/Tutorial (maximum of 6 additional credits (beyond the 18 required))	
HDFS 894	Practicum/Internship (focus on teaching or non-academic role)	
Non-Didactic Courses		8
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		39
HDFS 893	Individual Study/Tutorial (18 credits)	
HDFS 798	Master's Thesis (6 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	
Total Credits		90

Curriculum for students entering with a Master's degree (60 credits total)

- Students may follow this track only if their Master's degree and thesis was approved by the Developmental Science Committee upon admission.
- Additional coursework may be necessary to compensate for courses not taken.
- All courses 3 credits unless otherwise noted.

Code	Title	Credits
Development Core		12
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 815	Physical and Cognitive Development Across the Lifespan	
HDFS 817	Prevention Science	
Teaching Core		6
HDFS 892	Graduate Teaching Experience	
Choose one:		
HDFS 802	Teaching Developmental Science	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
STEM 810	Teaching College Science	
Methodology and Statistics Core		6
HDFS 856	Longitudinal Research Methods and Analysis	
One additional course in quantitative methods approved by adviser and committee or program coordinator		
Didactic Electives		3
could include HDFS 824, HDFS 825, HDFS 893, HDFS 894, or 700- or 800-level course in HDFS or other department.		
Non-Didactic Courses		8

HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 890	Graduate Seminar (Qualifying Exam/Career, 6 credits total)	
2 credits during spring before doing qualifying exam; 2 credits in summer during qualifying exam; 2 credits during final year to focus on career development		
Independent Research		25
HDFS 893	Individual Study/Tutorial (10 credits)	
HDFS 899	Doctoral Dissertation (15 credits)	
Total Credits		60

Other Requirements

- Teach one undergraduate course, with supervision, for course credit in HDFS 892. Must have first taken HDFS 802 (<https://currbulletin.ndsu.edu/search/?P=HDFS%20802>) Teaching Developmental Science as well as two courses out of HDFS 811, 813, 815, and 817.
- Submit at least four proposal/abstracts for presentations or posters at national conferences, including as a co-presenter (2 submissions if enter with MS)
- Present (in person) at least twice at national conferences (once if enter with MS), unless a waiver is granted by the student's committee.
- Submit at least two peer-reviewed articles for publication (including as co-author). Note: Although these presentation and publication requirements do not carry course credit per se, they are projects that would be worked on as part of HDFS 893 (<https://currbulletin.ndsu.edu/search/?P=HDFS%20893>) Individual Study/Tutorial, and/or HDFS 899 (<https://currbulletin.ndsu.edu/search/?P=HDFS%20899>) Doctoral Dissertation.
- Qualifying examination
- Dissertation

Core Faculty

Sean Brotherson, Ph.D.

Oregon State University, 2000

Research Interests: Parenting and Fatherhood; Healthy Marriages; Family Stress; Rural Families; Grief and Bereavement; Family Life Education; Family Policy

James E. Deal, Ph.D.

University of Georgia, 1987

Research Interests: Personality Development in Children; Relationship Between Individual Development and Family Relationships

Heather Fuller, Ph.D.

University of Michigan, 2009

Research Interests: Social Relationships Across the Lifespan (E.G. Intergenerational Relationships); Psychological Well-Being in Old Age; Culture and Aging; Migration, Transnationalism and Acculturation; Biculturalism

Joel Hektner, Ph.D.

University of Chicago, 1996

Research Interests: Aggressive Children; Research Methods; Prevention Programs For High-Risk Aggressive Children; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions That Facilitate Optimal Experiences (Flow) and Optimal Development; The Experience Sampling Method

Melissa Lunsman O'Connor, Ph.D.

University of South Florida, 2010

Research Interests: Cognitive and Functional Aging in Healthy and Clinical Populations; Older Drivers; Research Methods; Attitudes toward Dementia

Elizabeth Blodgett Salafia, Ph.D.

University of Notre Dame, 2008

Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Wen Wang, Ph.D.

Michigan State University, 2018

Research Interests: How culture and ethnicity shape parenting; Socialization of children's mastery motivation in at-risk families

Affiliated Faculty within HDFS

Carrie Johnson, Ph.D.

Iowa State University, 2012

Research Interests: Personal Finance for Low-Income and Under-served Populations; Financial Education Impact; Student Loan Debt; Program Delivery Methods and Evaluation; Behavioral Finance across the Lifespan

Christie McGeorge, Ph.D.

University of Minnesota, 2005

Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization From a Feminist Perspective

Meagan Scott Hoffman, Ph.D.

Oklahoma State University, 2016

Research Interests: Understanding How Changing Trends in Society Influence Youth; Afterschool Training; Positive Youth Development; Professional Development Methods to Better Meet the Needs of 4-H Staff

Thomas Stone Carlson, Ph.D.

Iowa State University, 2000

Research Interests: Narrative Pedagogy; Relational Accountability Approach to Couples Therapy, LGBT Affirmative Therapy Competence Among Therapists, and Influence of Spirituality on Clinical Practice and Training

Affiliated Faculty outside of HDFS

Ben Balas, Ph.D.,

Psychology

Sarah Boonstoppel, Ph.D.,

Political Science

Erin Conwell, Ph.D.,

Psychology

Donna Grandbois, Ph.D.,

Nursing

Britt Heidinger, Ph.D.,

Biological Sciences

Brent Hill, Ph.D.,

Education

Andrea Huseth-Zosel, Ph.D.,

Public Health

Linda Langley, Ph.D.,

Psychology

Carrie Ann Platt, Ph.D.,

Communication

Susan Ray-Degges, Ph.D.,

Apparel, Design and Hospitality Management

Molly Secor-Turner, Ph.D.,

Nursing

Kevin Thompson, Ph.D.,

Criminal Justice and Political Science

Rachelle Vetter, Ph.D.,

Center for 4-H Youth Development

Dietetics

Department Information

- **Interim Department Chair:**
Yeong Rhee, Ph.D.

- **Graduate Coordinator:**
Ashley Roseno, Ph.D.
- **Department Location:**
Bentson Bunker Fieldhouse, Rm. 1
- **Department Phone:**
(701) 231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/dietetics_on_line (http://www.ndsu.edu/hnes/dietetics_on_line/)
- **Credential Offered:**
M.S.

The M.S. in Dietetics program prepares registered dietitians to practice at an advanced level or pursue doctoral study. The Great Plains Interactive Distance Education Alliance program in Dietetics provides opportunities for registered dietitians and registration-eligible dietetic graduates to integrate and apply principles from the biomedical sciences, human behavior, and management to design and lead effective food and nutrition programs in a variety of settings. This program is fully online (http://www.ndsu.edu/hnes/dietetics_on_line (http://www.ndsu.edu/hnes/dietetics_on_line/)).

In a multi-institution degree program, students (must be registered dietitians or registration-eligible dietetic graduates):

1. Apply and are admitted to one university;
2. Enroll in all courses at that university; and
3. Graduate or receive a certificate from that university.

Students will be required to complete thirty-six credit hours and the following requirements:

- All core courses (9 credits)
- An additional 21 credits selected from the list of electives
- A thesis (6 credits) or 3 credits of additional electives + a comprehensive paper (plan B) or 6 credits of additional electives (Plan C).
- The student's schedule of courses must be approved by his/her faculty adviser and graduate committee and the Graduate School.

Code	Title	Credits
Core Courses		9
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 728	Current Issues in Dietetics	
STAT 725	Applied Statistics	
Electives		21
ADHM 635	Cost Controls in Hospitality and Food Service Systems	
ADHM 736	Entrepreneurship in Dietetics	
HNES 642	Community Health and Nutrition Education	
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 658	Advanced Medical Nutrition Therapy	
HNES 719	Public Health Nutrition	
HNES 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
HNES 729	Grant Writing for the Health Professional	
HNES 730	Fundamentals of Leadership	
HNES 732	Foodservice Operation Management	
HNES 733	Food Writing for Professionals	
HNES 734	Foodservice Systems within Healthcare	
HNES 740	Maternal and Child Nutrition	
HNES 741	International Nutrition	
HNES 742	Nutrition: A Focus on Life Stages	
HNES 743	Obesity Across the Lifespan	
HNES 744	Dietary and Herbal Supplements	
HNES 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	

HNES 750	Advanced Human Nutrition: Macronutrients
HNES 751	Metabolism of Micronutrients
HNES 752	Phytochemicals
HNES 753	Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition
HNES 756	Pediatric Clinical Nutrition
HNES 757	Nutritional Aspects of Oncology
HNES 758	Clinical Aspects of Nutrition Support
HNES 759	Nutrition and Immunology
Research	
HNES 798	Master's Thesis

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Elizabeth Hilliard, Ph.D.

North Dakota State University, 2018

Research Interests: Dietetics

Yeong Rhee, Ph.D.

Oklahoma State University, 1999

Research Interests: Chronic Disease Prevention, Immune Function, Functional Foods, Microbiome

Sherri Nordstrom Stastny, Ph.D.

North Dakota State University, 2007

Research Interests: Macronutrients for Health Aging

Education - Doctoral

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Doctoral Graduate Coordinator:**
Laura Parson, Ph.D.
- **Department Location:**
School of Education, FLC 210
- **Department Phone:**
(701) 231-7921
- **Department Web Site:**
www.ndsu.edu/edp (<http://www.ndsu.edu/edp/>)
- **Application Deadline:**
February 1
- **Credential Offered:**
Ph.D., Ed.D.
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5, PTE Academic 59

Program Description

The Education Doctoral Programs prepare scholars who advance education research and practice and maintain the integrity and vitality of the profession. Our graduates are stewards of the discipline, individuals entrusted with preserving, creating, and applying knowledge in education and with communicating educational knowledge to others.

North Dakota State University offers both the Ph.D. and Ed.D. degrees in Education, with an emphasis in **Adult and Community Education, Institutional Effectiveness**, or **Organizational Learning and Leadership**. The Ph.D. emphasizes the study and synthesis of theory and research. The purpose of the Ph.D. is to produce dedicated scholar-researchers committed to the advancement of knowledge and scholarship in the field and scholar-practitioners with a strong depth in research preparation for practice. The Ed.D. degree focuses on translating theory and research into practice, and has the larger goal of preparing scholar-practitioners who will be well-informed, credible leaders in the field.

ADULT AND COMMUNITY EDUCATION

The Adult and Community Education curriculum is designed to provide the knowledge, skills, and experiences required for advancing the nature, function, and scope of adult learning in all educational settings. This program prepares graduates to be leaders in profit and non-profit industries.

Graduates become professors of adult or community education, leaders of non-profit organizations, and consultants for training development programs.

INSTITUTIONAL EFFECTIVENESS

The Institutional Effectiveness curriculum is designed to provide the knowledge, skills, and experiences needed for understanding institutional performance in all educational settings. This program focuses on the role of assessment, evaluation, and other analysis techniques needed to support institutional planning, policy formation, and decision-making. Graduates become assessment directors at post-secondary institutions and education consultants.

ORGANIZATIONAL LEARNING AND LEADERSHIP

The Organizational Learning and Leadership curriculum is designed to provide the knowledge, skills, and experiences necessary for promoting organizational change in all educational settings. This program equips graduates to become effective leaders in educational contexts by integrating leadership theory with practice. Graduates become administrators in K-12 and postsecondary schools, museums, and youth development organizations.

Admission

Qualified students may apply for admission through the Graduate School online application. In addition to the standard Graduate School application materials, applicants must submit an essay stating how their career goals align with the mission and goals of the Education Doctoral Programs as described on the program website. Admission is only considered after all required application materials are received by the Graduate School and reviewed by the program's faculty. An interview may be required. Admission is a selective process and decisions are based on the congruency of the applicant's professional goals with the program goals, predicted success of the applicant as a student and professional in the chosen field, and are made only after considering all available data. A student must meet all requirements for unconditional admission. Application deadline for priority admission is February 1.

Financial Assistance

Graduate assistantships may be available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

Courses

All registrations in Education Doctoral courses must be approved by the student's adviser. Only those courses approved by the student's supervisory committee may be included on the final plan of study leading to the degree.

Credit Hours

The Education Doctoral Programs require a minimum of 90 semester hours beyond the bachelor's degree (a minimum of 60 semester hours beyond the master's degree). The advisory committee has authority to approve up to a maximum of 30 credit hours from a Masters degree or equivalent. An additional ten (10) hours may be allowable if candidate has multiple graduate degrees or coursework after the first graduate degree. The determination will be based upon review of the candidate's official transcript(s). The candidate's major adviser and committee are responsible for approving the program of study and for certifying that the candidate has met the academic requirements for the doctoral degree. The doctoral degree is awarded for expertise and excellence in the candidate's chosen field of study as recognized and approved by the adviser and committee, not just for an accumulation of credits.

Code	Title	Credits
Core Courses		
EDUC 801	Foundations of Doctoral Scholarship	3
EDUC 802	Foundations of Educational Research	3
EDUC 803	Philosophical Foundations of Education	3
EDUC 890	Graduate Seminar (Capstone Seminar)	3
EDUC 890	Graduate Seminar (1 credit per semester)	1
Select One:		3
EDUC 806	International and Comparative Education	
EDUC 807	Diversity and Educational Policy	
EDUC 808	Empowerment & Transformative Education	
Discipline Inquiry Core (Note: Required and Optional courses vary by degree and option area)		
EDUC 871	Planning and Conducting Needs Assessment	3
EDUC 872	Qualitative Research Methods	3
EDUC 873	Case-Based Educational Research and Statistics	3

EDUC 881	Computer Data Management and Decision Making	2
EDUC 882	Institutional Analysis Techniques	3
EDUC 883	Survey Research	3
EDUC 884	Program Evaluation Research	3
EDUC 885	Structural Equation Modeling Fundamentals	3
EDUC 886	Advanced Qualitative Research	3
HDFS 856	Longitudinal Research Methods and Analysis	3
Option Core Courses		9
Institutional Effectiveness		
EDUC 831	Institutional Quality Control	
EDUC 832	Assessment Techniques for Educational Institutions	
EDUC 833	Strategic Planning for Institutional Improvement	
Adult and Community Education		
EDUC 851	Adult Learning	
EDUC 852	Foundations of Occupational & Adult Education	
EDUC 853	Instructional Methods for Adult Learners	
Organizational Learning and Leadership		
EDUC 811: Organizational Culture (New course, pending approval)		3
EDUC 812: Leadership in Organizations (New course, pending approval)		3
EDUC 813: Innovation and Change (New course, pending approval)		3
Professional Emphasis Area		9-12
EDUC 899	Doctoral Dissertation	12
Total Credits		60-90

Sara Bano, Ph.D.

Assistant Professor
Michigan State University, 2020

Justin Benna, Ph.D.

Assistant Professor
University of New Hampshire, 2018
Research Interests: PK-12 School Leadership, Social and Political Contexts of Schools, Educator Development and Professional Learning

Amanda Cordova, Ph.D.

Assistant Professor
University of Texas at San Antonio, 2018

Sarah Crary, Ph.D.

Assistant Professor
University of North Dakota, 2018
Research Interests: Information Literacy, K-12 Education Change, Post-Secondary Readiness, Leadership

Laura S. Dahl, Ph.D.

The Ohio State University, 2019
Research Interests: College Student Learning and Development, Institutional Effectiveness in Higher Education and Student Affairs, Collegiate Bystander Intervention, Educational Measurement through Rasch Modeling

Elizabeth A. Gilblom, Ph.D.

Cleveland State University, 2017
Research Interests: Geographic Information Systems, Privatization in Education, Equity in Education, Critical Social Theory

Brent D. Hill, Ph.D.

Oklahoma State University, 2011
Research Interests: Monte Carlo Simulations, Educational and Psychological Measurement, Learning Theory, Structural Equation Modeling, Q Methodology, Time Series Analysis

Hollie Mackey, Ph.D.

Associate Professor
Pennsylvania State University, 2010

Research Interests: Indigenous Theory and Methodology, Critical Policy Analysis, Self-Determination in Education, Ethical Leadership, Education Law

Cailen O'Shea, Ph.D.

Assistant Professor

University of Nebraska-Lincoln, 2020

Research Interests: School Transformation, Innovation for Equitable Education, PK-12 School Leadership, Quantitative Methods

Laura Parson, Ph.D.

University of North Dakota, 2016

Research Interests: Teaching and Learning in Higher Education (SoTL), Women in Higher Education, Women in STEM, Ethnographic and Discourse Methods of Inquiry

Chris M. Ray, Ph.D.

Oklahoma State University, 2007

Research Interests: Institutional Effectiveness, Learning Outcomes Assessment, Instrument Development, Moral Development and Education, College Student Development

Nathan B. Wood, Ph.D.

University of Minnesota, 2006

Research Interests: Socio-cultural Issues in Education, Scholar Identity, Identity Work, Apprenticeship in Scholarly Inquiry and Practice

Education - Master's

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Program Coordinator:**
Jeanette Hoffman, Ph.D.
- **Department Location:**
School of Education, FLC 210
- **Department Phone:**
(701) 231-7921
- **Department Web Site:**
www.ndsu.edu/ted/ (<http://www.ndsu.edu/ted/>)
- **Application Deadline:**
March 15 for summer and fall admission; October 15 for spring admission.
- **Credential Offered:**
M.Ed.; M.S.
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5

Program Description

The School of Education offers graduate study leading to the Master of Education (M.Ed.) and Master of Science (M.S.) degrees. Graduate majors are offered in the following areas: Curriculum and Instruction, Agricultural Education, English Education, Family and Consumer Sciences Education, History Education, Mathematics Education, Music Education, Science Education, Social Science Education and Teacher Licensure.

The graduate program in Teacher Education is committed to the further development of educational leaders who are dedicated to educational equity for all persons. The Teacher Education graduate program is aligned with the National Board for Professional Teaching Standards (NBPTS) and Interstate Teacher Assessment and Support Consortium (InTASC) to reflect the importance of applied research and content development of educators. Programs offered in Teacher Education are designed for the practitioner. Students pursuing the M.Ed. will engage in action research as a component of the program. Students are encouraged to work closely with an academic adviser to ensure that personal and professional goals are clear and achievable.

Curriculum and Instruction

The program focuses on further development of teacher leaders. The curriculum includes areas of human development, learning, foundations of education, school curriculum, assessment, and further study in areas of interest. Candidates choosing this option for an M.S. degree must also complete a thesis.

Agricultural Education (p. 748)

Agricultural Education offers graduate study leading to the M.Ed. and M.S. degrees. Advanced work may involve specialized training in vocational education, extension education, international extension, and agricultural education.

Degree programs are planned cooperatively to meet the needs of individual students. Candidates are encouraged to include supporting work relevant to subject matter areas of interest. Some courses focus on problems related to various phases of Agricultural Education, including secondary, post-secondary, adult, and extension programs. Others emphasize issues common to all service areas in agricultural and extension education. Provision may be made for candidates to include internships in agribusiness, natural resources education, or other aspects of agricultural and extension education in their programs. Candidates should work closely with an adviser.

English Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work with their advisers if licensure is desired.

Family and Consumer Sciences Education (p. 860)

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

History Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work with their advisers if licensure is desired.

Mathematics Education

Content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work their advisers if licensure is desired.

Music Education (p. 907)

The Master of Education (M.Ed.) degree with a Music Education option is a dual program offered collaboratively by the School of Education and the Department of Music. The program is designed to facilitate the needs of currently working music teachers as well as students who wish to continue their education to the master's level after having completed the baccalaureate degree. It is possible to complete the M.Ed. degree in Music Education by attending three consecutive summer sessions, two years in residence during the academic year, or a combination of both. Most courses in the degree program are offered in the late afternoon or evening. Applied study may be in the areas of vocal, instrumental, or conducting. Students electing the choral emphasis will take vocal pedagogy and survey of choral literature. Students electing the instrumental emphasis will take instrumental pedagogy (woodwind, brass, or percussion) and survey of band literature. No thesis is required; rather, students will complete 2 three-credit hour practicum experiences: one in education and one in music. The practica will be agreed upon and planned jointly by the student and his/her adviser(s).

Science Education

This content-focused master's degree program in Teacher Education focuses on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work with their advisers if licensure is desired.

Social Science Education

This content-focused master's degree program in Teacher Education focus on increasing both pedagogical skills and content expertise. Candidates in these programs complete the four core pedagogical courses listed on the program of study and at least nine credits of master's-level content coursework; the total program of study is typically 33-36 credits. Candidates work with their graduate committee and adviser to

identify an appropriate plan of study. This degree plan does not lead to teacher licensure, and candidates are encouraged to work with their advisers if licensure is desired.

Teacher Licensure

The Teacher Licensure option allows candidates with a degree in teachable major to complete professional education coursework to earn teacher licensure. The program is aligned with ND teacher licensure options but transfers well to other states. Additional content coursework may be needed to meet licensure requirements and will be evaluated upon entry to the program. The Praxis Core Academic Skills exam is required for full admission to the program. Contact the Teacher Education program for a transcript evaluation to determine a plan of study.

The NDSU programs in education are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

In addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS) (<http://www.nbpts.org/>), as well as reasons for applying to the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals.

In addition to meeting the requirements stated above, applicants must meet two additional requirements for the **Teacher Licensure** option:

1. Hold a bachelor's degree in a content area related to a teaching major offered at NDSU, including the following: biology, chemistry, earth science, English, French, health, history, mathematics, music, physics, or Spanish. If you hold a different major, consult with program faculty for additional information.
2. Pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math.
3. Complete 20 hours working with youth. Verification forms are provided in the application system.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree. Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Teacher Education Required Courses

Code	Title	Credits
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
Major/Concentration		18
EDUC 794	Practicum/Internship (or)	3
EDUC 798	Master's Thesis	6-10

Teacher Licensure Option

Code	Title	Credits
Professional Education Coursework		
EDUC 651P	Instructional Planning, Methods and Assessment	3

EDUC 681P	Classroom Practice/Methods of Teaching I (Some content areas require an additional special methods course, EDUC 682)	3
EDUC 685P	Student Teaching Seminar	1
EDUC 686	Classroom Management for Diverse Learners	3
EDUC 689	Teaching Students of Diverse Backgrounds	3
EDUC 724	Advanced Educational Psychology	3
EDUC 775	Content Area Reading	2
Content Area & Elective Coursework		
Practicum		
EDUC 687P	Student Teaching	9
EDUC 688P	Applied Student Teaching	3

Core Faculty

Mari Borr, Ph.D.

University of North Dakota, 2005

Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Stacy Duffield, Ph.D.

University of North Dakota, 2003

Research Interests: Middle School, Literacy, Learning Theory, and Instructional Practices

Jeanette Hoffman, Ph.D.

University of St. Thomas, 2006

Research Interests: Multicultural education, Social justice education, Assessing student learning

Adam A. Marx, Ph.D.

University of Missouri, 2014

Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Larry Napoleon, Ph.D.

The Pennsylvania State University-University Park, 2009

Research Interests: Student Options and Retention, Career and Technical Education, Historically Disenfranchised Learners, African-American History

James M. Nyachwaya, Ph.D.

University of Minnesota, 2012

Research Interests: High School And College Students' Conceptual Understanding of the Particulate Nature of Matter, Pre-Service And In-Service Teachers' Pedagogical Content Knowledge (PCK) of Chemistry/Science

Florin Salajan, Ed.D.

Columbia University, 2007

Research Interests: Areas Of Expertise: Interactive Learning Technologies; Educational Technology Effectiveness For Teaching And Learning; Generational Attitudes Toward Learning Technologies; Comparative E-Learning; European Higher Education Policies; International Education

Teresa Shume, Ph.D.

University of North Dakota, 2013

Research Interests: Place-based Environmental Education, Socio-Scientific Issues, Ecojustice Theory and Practice, Systems Thinking, Content-Area Language Instruction

Justin J. Wageman, Ph.D.

University of North Dakota, 1999

Research Interests: Standards, Curriculum, Instruction, Assessment, Professional Development and Evaluation

Associate Faculty

Abraham Ayebo, Mathematics Education

Ashley Baggett, History Education

Warren Christensen, Physics/STEM Education

Mila Kryjevskaja, Physics/STEM Education

Jenny Linker, Physical Education

William Martin, Mathematics/STEM Education

Lisa Montplaisir, Biology/STEM Education

Warren Olfert, Music Education

Kelly Sassi, English Education

Michael Weber, Music Education

Educational Leadership

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Program Coordinator:**
Laura Parson, Ph.D.
- **Department Location:**
School of Education, FLC 216
- **Department Phone:**
(701) 231-7202
- **Department Web Site:**
www.ndsu.edu/edol/ (<http://www.ndsu.edu/edol/>)
- **Application Deadline:**
April 1
- **Credential Offered:**
Ed.S., M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5

Program Description

The purpose of the Educational Leadership program is to provide professional and/or academic preparation for individuals interested in leadership roles in K-12 and higher education settings. These roles include teacher leaders, mid-level administrators (e.g., school principal or higher education administrators), and upper-level administrative positions such as district superintendents.

Degrees offered include a 32-credit Master of Education (M.Ed.) in Educational Leadership – K-12 Leadership and a 36-credit Master of Education (M.Ed.) or Master of Science (M.S.) in Educational Leadership - Higher Education Administration.

K-12 LEADERSHIP

The K-12 Leadership option is designed to transform your passion for education using the professional and organizational skills necessary for leadership that focuses on student success. Graduates from this program have the knowledge, skills, and experiences to lead others through informed decision-making and collaboration.

The K-12 Leadership program is accredited by the National Council for Accreditation of Teacher Education (NCATE) and approved by the North Dakota Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

HIGHER EDUCATION ADMINISTRATION

The Higher Education Administration option is designed to provide the foundations of practice, research and theory of higher education and student affairs essential for leadership in post-secondary contexts. Graduates from this program have the knowledge, skills, and experiences to become change-agents on college and university campuses.

Admission

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission. After being accepted for graduate study in the School of Education, the student should contact her/his assigned adviser assigned for assistance in filing a plan of study for consideration by the program.

Applications are due by April 1st.

Required application materials are as follows:

Master of Education (M.Ed.) or the Master of Science (M.S.) in Educational Leadership

- Official transcripts of all previous collegiate work, including one verifying graduation with a bachelor's degree from an accredited institution;
- A cumulative baccalaureate GPA of 3.0 on a 4.0 scale;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student in the chosen master's degree program and as an educational leader; and
- A leadership essay.

The Master of Science (M.S.) and the Education Specialist (Ed.S.) degrees require a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary in their requirements for a written comprehensive exam or a portfolio/oral.

Sara Bano, Ph.D.

Assistant Professor

Michigan State University, 2020

Justin Benna, Ph.D.

Assistant Professor

University of New Hampshire, 2018

Research Interests/Areas of Expertise: PK-12 School Leadership; Social and Political Contexts of Schools; Educator Development and Professional Learning

Amanda Cordova, Ph.D.

Assistant Professor

University of Texas at San Antonio, 2018

Sarah Crary, Ph.D.

Assistant Professor

University of North Dakota, 2018

Research Interests/Areas of Expertise: Information literacy, K-12 education change, Post-Secondary Readiness, and Leadership

Laura S. Dahl, Ph.D.

Assistant Professor

The Ohio State University, 2019

Research Interests/Areas of Expertise: College Student Learning and Development, Institutional Effectiveness in Higher Education and Student Affairs, Collegiate Bystander Intervention, Educational Measurement through Rasch Modeling

Liza Gilblom, Ph.D.

Assistant Professor

Cleveland State University, 2017

Research Interests/Areas of Expertise: Geographic Information Systems, Privatization in Education, Equity in Education, Critical Social Theory

Brent Hill, Ph.D.

Associate Professor

Oklahoma State University, 2011

Research Interests/Areas of Expertise: Monte Carlo Simulations, Educational and Psychological Measurement, Learning Theory, Structural Equation Modeling, Q Methodology, Time Series Analysis

Hollie Mackey, Ph.D.

Associate Professor

Pennsylvania State University, 2010

Research Interests/Areas of Expertise: Socio-cultural Dimensions of Educational Leadership, Indigenous Theory and Methodology, and Educational, Self-Determination

Cailen O'Shea, Ph.D.

Assistant Professor

University of Nebraska-Lincoln, 2020

Research Interests/Areas of Expertise: School Transformation, Innovation for Equitable Education, PK-12 School Leadership, Quantitative Methods

Laura Parson, Ph.D.

Assistant Professor

University of North Dakota, 2016

Research Interests/Areas of Expertise: Teaching and Learning in Higher Education (SoTL), Women in Higher Education, Women in STEM, Ethnographic and Discourse Methods of Inquiry

Chris Ray, Ph.D.

Associate Professor & Head, School of Education

Oklahoma State University, 2007

Research Interests/Areas of Expertise: Institutional Effectiveness, Learning Outcomes Assessment, Instrument Development, Moral Development and Education, College Student Development

Nathan Wood, Ph.D.

Associate Professor

University of Minnesota, 2006

Research Interests/Areas of Expertise: Socio-Cultural Issues in Education, Identity Development, Preparation of Educational Researchers

Electrical and Computer Engineering

Department Information

- **Department Chair:**
Benjamin Braaten, Ph.D.
- **Graduate Coordinator:**
Sudarshan Srinivasan, Ph.D.
- **Department Location:**
101 Electrical Engineering Building
- **Department Phone:**
(701) 231-7019
- **Department Web Site:**
www.ndsu.edu/ece/ (<http://www.ndsu.edu/ece/>)
- **Application Deadline:**
February 28 for fall and October 15 for spring (openings may be very limited for spring)
- **Credential Offered:**
Ph.D., M.S., M.Engr.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibT 71, IELTS 6; To qualify for teaching assistantship TOEFL ibT 100, IELTS 7

Program Description

The Department of Electrical and Computer Engineering offers graduate programs in selected specialty areas leading to the M.Engr., M.S. and Ph.D. in Electrical and Computer Engineering. Current departmental research expertise falls into one of the following areas: Biomedical Engineering, Communications/Signal Processing, Computer Architecture, Cyber Physical and Embedded Systems, Electromagnetics/Optics, Power/Power Electronics, and VLSI. The ECE Department is also a key contributor to NDSU's Research and Technology Park.

Research Facilities and Equipment

The department is housed in a modern, well-equipped building. Graduate students have access to laboratories, instrument rooms, and computer services ranging from the university computer system to departmental computers. Research facilities include cardiovascular engineering lab, computer architecture lab, digital systems lab, EMI shield room, power and power electronics lab, signal processing and systems lab, and printed circuit lab.

Admission Requirements

The preferred avenue is to contact and work with an NDSU ECE Professor before coming to NDSU, such that the professor recommends you for admittance into the program. Each professor will have different expectations for the amount and type of work he/she will require you to do in order for him/her to recommend you for admittance into the NDSU ECE graduate program. Please look at each faculty's website (<https://www.ndsu.edu/ece/people/faculty/>) and contact a faculty member working in a research area in which you are interested in pursuing your graduate studies. A secondary avenue is to have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your latest Electrical Engineering or Computer

Engineering degree, either B.S. or M.S. The GRE subject area test is not required. To be admitted as an ECE M.E. student, you must have a GRE score of at least 145 Verbal and 155 Quantitative and a minimum GPA of 3.0 on your Electrical Engineering or Computer Engineering B.S. degree.

The 3.0 minimum GPA admission requirement may be waived for M.E. students with substantial ECE industry experience. The GRE subject area test is not required.

Financial Assistance

The department has a limited number of both teaching and research assistantships available. These assistantships provide a monthly salary during the academic year, a waiver of graduate tuition during the academic year and summer, but do not cover the minimal activity fee. In addition, there are opportunities, both in the department and on the campus, to perform part-time work as graders, teachers, tutors, and consultants. These assistantships are awarded on a competitive basis – typically at the time of admission for fall semester.

Master of Engineering and Master of Science

The Master of Engineering and the Master of Science degrees require a minimum of 30 semester credits beyond the B.S. degree. The Master of Engineering is a course-work only program requiring a capstone consisting of a portfolio or written exam. For the Master of Science, 6 hours of the 30 must be assigned to the thesis. All students must pass a final oral examination covering both course work, and the thesis.

Ph.D. Program

The Doctor of Philosophy degree requires a minimum of 90 credits beyond the baccalaureate with an overall GPA of 3.0 or higher. Of these 90 credits, a minimum of 36 credits of graduate-level coursework and a minimum of 30 credits of dissertation are required, including ECE 702: Advanced Research Topics, 1 credit.

Academic Good Standing

All graduate students must maintain a 3.00 GPA or better and make significant progress towards their degree to remain in good standing. Failing to do either may hinder the student's financial assistance and/or ability to register for courses in the ECE graduate program.

Benjamin Braaten, Ph.D.

North Dakota State University, 2009

Research Interests: Applied Electromagnetics, Electromagnetic Compatibility and Signal Integrity

Dong Cao, Ph.D.

Michigan State University, 2012

Research Interests: Power Electronics and High Power Electrical Motor Drives, Renewable Energy Systems Grid-Integration and Standalone Operation, Power Management For Smart Grid, Transportation Electrification/Hybrid Electric Vehicle, Microgrid/Distributed Generation Source, Wide-Band Gap Device

Nilanjan Ray Chaudhuri, Ph.D.

Imperial College, 2011

Research Interests: Power System Dynamics and Control, Wide-Area Monitoring Systems, Application Of Power Electronics In Power Systems, Online System Identification, FACTS, HVDC, Renewable Energy Systems, Distributed Energy, Demand Side Response

Debasis Dawn, Ph.D.

Tohoku University, 1993

Research Interests: Microelectronics/Microsystems, Radio Frequency Integrated Circuits (RFIC) Silicob (CMOS/SiGe), Ics for radar, sensors

Daniel L. Ewert, Ph.D.

University of North Dakota, 1989

Research Interests: Biomedical Engineering

Jacob Glower, Ph.D.

The Ohio State University, 1988

Research Interests: Control Systems, Digital Systems

Na Gong, Ph.D.

University of Buffalo, SUNY, 2013

Research Interests: VLSI, Computer Architecture, and EDA

Roger Green, Ph.D.

University of Wyoming, 1998

Research Interests: Signal Processing, Array Processing, Time-frequency Analysis

Sanjay Karmakar, Ph.D.

University of Colorado, Boulder 2012

Research Interests: Wireless Communications, Information Theory, Coding for MIMO Systems

Rajesh G. Kavasseri, Ph.D.

Washington State University, 2002

Research Interests: Power Systems, Nonlinear Dynamics, Renewable Energy resources

Samee U. Khan, Ph.D.

University of Texas-Arlington, 2007

Research Interests: Optimization, Robustness, and Security Of: Cloud, Grid, Cluster and Big Data Computing, Social Networks, Wired and Wireless Networks, Power Systems, Smart Grids, and Optical Networks.

Ivan T. Lima Jr., Ph.D.

University of Maryland, Baltimore County, 2003

Research Interests: Photonics

Dharmakeerthi Nawarathna, Ph.D.

University of Houston, 2005

Research Interests: Lab-on-a-chip Technologies, Single-cell Genomics, Nanobio-engineering, Tissue Engineering, Novel Imaging Techniques for Biology and Computational Simulations.

David A. Rogers, Ph.D.

University of Washington, 1971

Research Interests: Microwave Engineering, Electromagnetics, Fiber Optics

Mark Schroeder, Ph.D.

University of Texas, Austin, 1999

Research Interests: Biomedical Engineering

Scott C. Smith, Ph.D.

University of Central Florida, 2001

Research Interests: Asynchronous Logic, VLSI, Computer Architecture, Embedded Systems

Sudarshan Srinivasan, Ph.D.

Georgia Institute of Technology, 2007

Research Interests: Computer Engineering

Danling Wang, Ph.D.

University of Washington, 2013

Research Interest: Development of Sensor Devices Based on Novel Nanostructured Materials and Advanced Techniques. Focusing on Sensor Design, Fabrication, and Application of Early-Stage Human Disease Monitoring and Diagnosis, Such as Breath Analyzer for Diabetes; Industrial, and Military Safety, Such as Environmental Explosive or Toxic Gas Detection

Jinhui Wang, Ph.D.

University of Rochester and Beijing University of Technology, 2006

Research Interests: VLSI, Power Management for SoC and Microprocessor, Novel Memory Design, CAD Methodologies in VLSI

Qifeng Zhang, Ph.D.

Peking University, 2001

Research Interests Electric Materials and Devices for Energy Conversion and Storage, involving Solar Cells, Lithium Batteries, and Solid State Electrolytes; Nanomaterials for Sensor and Biomedical Applications; and Nanotechnology

Emergency Management

Department Information

- **Department Chair:**
Jessica Jensen, Ph.D.
- **Department Location:**
Minard Hall
- **Department Phone:**
(701) 231-5595
- **Department Web Site:**
www.ndsu.edu/emgt/ (<http://www.ndsu.edu/emgt/>)

- **Application Deadline:**
Applications are reviewed on a rolling schedule.
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE (All applicants who have not completed a master's degree in the United States.)
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The master's program—comprehensive study option—can be taken remote "live" or in person, on campus. Remote "live" means that students have the option of completing all of their coursework at the same time and day as our on campus students via Zoom. The master's program—thesis option—and doctoral degree programs in emergency management at NDSU are only available on campus. Potential students are encouraged to visit the campus and meet faculty and current graduate students.

The mission of NDSU's Emergency Management Program is to create a cadre of graduates with extensive theoretical and applied knowledge in emergency management who can advance the field and discipline of emergency management. The program is built on a core of emergency management and methods/theory courses to help students approach the study of disasters and emergency management from the emergency management disciplinary perspective. Additionally, the program draws from other disciplines that enhance the development of processes and techniques to deal with emergencies and disasters.

Master of Science Degree

The comprehensive and challenging Master's degree program in Emergency Management is intended to explore the academic research literature related to emergency management as well as provide students with opportunities to apply their knowledge through research and/or practicum. The program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. The program emphasizes the study of how human beings cope with hazard events through activities related to preparedness, response, recovery, and mitigation.

The Department of Emergency Management offers two tracks in its master's degree program. The first option - the thesis track - is a research-focused degree track that entails a combination of emergency management course work and research methods. This option is ideal for graduate students who intend to pursue a doctoral degree in Emergency Management or a related discipline and for those students who want to complete a traditional master's degree. The second option - the comprehensive study option - is a more practice-based track with course work in emergency management and a significant practicum requirement. This second option may be completed on campus or at a distance. The distance format involves taking coursework at the same time and day as our on campus students but from wherever the student lives.

Doctoral Degree

North Dakota State University offers a Doctor of Philosophy in Emergency Management designed to prepare graduates for careers teaching future generations of emergency management students in higher education programs, conducting research that describes and explains patterns, processes, change, and effectiveness/efficiency related to emergency management, and/or policy development and analysis related to emergency management.

The degree program is built on a core of emergency management courses to help students learn how human beings create, interact, and cope with hazards, vulnerability, and associated events. The program emphasizes the study of how human beings cope with hazard events through activities related to preparedness, response, recovery, and mitigation.

This comprehensive and challenging program is committed both to extensive research and its practical application in the areas of emergency management. Throughout their graduate career, students will have the opportunity to conduct research and work in the field.

The Ph.D. is awarded in recognition of significant depth of understanding and scholarly achievement in emergency management. The recipient must complete all of the required course work, pass two written comprehensive exams (i.e., one on emergency management theory and one on the two functional areas in which the student has specialized), complete a novel and significant research project for the dissertation; and successfully defend this research in an oral examination. The student's progress will be reviewed by a supervisory committee that is responsible for reviewing the student's plan of study, written comprehensive examinations, dissertation proposal, and dissertation defense.

The Department of Emergency Management at NDSU welcomes applicants of any and all backgrounds to its master's degree program—comprehensive study option. This option may be completed on campus or at a distance, remote "live". Remote "live" means you can complete your coursework at the same day and time as our on campus students but from wherever you live!

The Department of Emergency Management at NDSU is more selective in choosing graduate applicants for entry into the master's program--thesis option--and the doctoral program. Admission is competitive reflecting the department's commitment to small, high quality, student cohorts that match the mentoring capacity of the faculty.

Applicants will be evaluated in a two-stage process. In the first stage, the applicant's Graduate School application, letters of reference, GRE scores (if applicable), and academic writing paper samples will be reviewed by the Department of Emergency Management faculty. Applicants demonstrating goodness-of-fit with the Department of Emergency Management's mission and goals and an aptitude for graduate study will be invited to complete the second stage of the admissions process.

Admissions Process

The two-stage admissions process for graduate studies in the Department of Emergency Management is as follows:

STAGE ONE

1. Applicants must first complete the Graduate School's online application form (https://app.applyyourself.com/AYApplicantLogin/fl_ApplicantConnectLogin.asp?id=ndusndsugr) and submit the required materials.
2. Applicants must submit transcripts from the higher education institutions they have attended to the Graduate School.
3. Applicants must submit three letters of reference through the Online Application tool. Academic references are preferred.
4. All applicants who have not completed a master's degree in the United States must submit GRE scores. If an applicant has completed a master's degree in the United States, then GRE scores are not required but still strongly recommended. It is helpful to have as much data as possible about applicants and their aptitude for graduate work in our program. In no case are specific GRE discipline tests required. At this time, however, no specific score totals are used as a cutoff. Applications are evaluated holistically using all indicators of student aptitude for successful completion of graduate study in this program. Applicants must submit GRE scores by requesting that ETS-GRE (<http://www.ets.org/gre/>) send the NDSU Graduate School their score. *NOTE: While GRE testing centers remain closed due to COVID-19, the Department has suspended the GRE requirement. The requirement will automatically resume once testing centers reopen.*
5. Applicants must submit electronic copies of two writing samples through the Online Application tool. The samples may be a publication, material from prior course work, or specifically written for this application. The samples do not have to focus on emergency management or disasters. The samples must be written in English. Writing samples are used to gain information on the applicant's writing style and ability to write research-based papers. Samples submitted in support of an application would ideally be eight or more pages in length. In addition, to meet the objective of the admission criteria, the paper must employ formal citations. Writing samples will most typically be library-based research papers but papers based on original data gathering are also encouraged. The latter might be more likely to come from an applicant with a master's degree.

STAGE TWO

1. Applicants invited to participate in the second stage of the admissions process will take part in a conference call interview with two or more of the program faculty. Applicant interviews are designed to provide two-way communication between the faculty and prospective applicant. Faculty will ask questions but will also want the applicant to pose questions about the program and departmental educational objectives. The interview should assist the applicant and faculty to further assess the goodness-of-fit between the program and the applicant.

Financial Assistance

Both teaching and research assistantships are available, contingent on departmental and faculty research funds. All students are automatically considered for graduate assistantships, unless they request otherwise, so no separate application process is required for such consideration. Awards are based on past academic and professional performance. The review process is highly competitive.

Emergency Management Master's Thesis Track

Code	Title	Credits
Core		
SOC 700 or COMM 704	Qualitative Methods Qualitative Research Methods in Communication	3
SOC 701 or COMM 707	Quantitative Methods Quantitative Research Methods in Communication	3
EMGT 720	Theory, Research and Practice	3
Disaster Phases		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		

Select 3 of the following:		9
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	3
Thesis		
EMGT 798	Master's Thesis (minimum 6 - maximum 10 credits, only 6 count toward degree)	6
Total Credits		39

Emergency Management Master's Comprehensive Study Track

Code	Title	Credits
Core		
EMGT 720	Theory, Research and Practice	3
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Electives		
Group A: Emergency Management Elective Courses		
Select four of the following:		12
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
ANTH 664	Disaster and Culture	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Critical Thinking and Analysis Elective Courses		
Select two of the following:		6
EMGT 614	Spatial Analysis in Emergency Management	
SOC 700	Qualitative Methods ¹	
SOC 701	Quantitative Methods ^{1,2}	
STAT 725	Applied Statistics	
EMGT 730	Advanced Research Methods	
Practicum		
EMGT 795	Field Experience	6
Total Credits		39

- ¹ Students must have completed an undergraduate research methods course prior to enrolling in Quantitative and Qualitative Methods.
- ² Students must complete a statistics course as a prerequisite for Quantitative Methods.
- * Those students lacking in field experience will be expected to complete an applied, field-based emergency management practicum; however, students with ample field experience in emergency management will be expected to complete a research practicum to fulfill the practicum credits. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. The student and his /her adviser will determine the type of practicum a student ought to take.

Doctorate in Emergency Management

Code	Title	Credits
Core		
Theory and Methods		
SOC 700	Qualitative Methods ¹	3
SOC 701	Quantitative Methods ^{1,2}	3
EMGT 720	Theory, Research and Practice	3
STAT 725	Applied Statistics	3
Emergency Management Functional Areas		
EMGT 761	Preparedness Theory and Practice	3
EMGT 762	Mitigation Theory and Practice	3
EMGT 763	Response Theory and Practice	3
EMGT 764	Recovery Theory and Practice	3
Functional Area Specialization (complete two courses)		
EMGT 861	Preparedness Theory II	
EMGT 862	Mitigation Theory II	
EMGT 863	Response Theory II	
EMGT 864	Recovery Theory II	
Electives		
Group A: Emergency Management Elective Courses (complete six courses)		18
EMGT 610	Comprehensive Emergency Management Planning	
EMGT 614	Spatial Analysis in Emergency Management	
EMGT 620	Hazard, Risk, and Vulnerability Assessments	
EMGT 625	International Emergency Management	
EMGT 635	Issues in Homeland Security and Emergency Management	
EMGT 645	Vulnerability and Functional Needs in Emergency Management	
EMGT 661	Business Continuity & Crisis Management	
EMGT 663	Voluntary Agency Disaster Services	
EMGT 681	Disaster Analysis	
EMGT 696	Special Topics	
Group B: Other Elective Course (complete six courses) ³		18
Practicum		
EMGT 794	Practicum/Internship ⁴	6
EMGT 895	Field Experience	9
Dissertation		
Dissertation		15
Total Credits		90

- ¹ Students must have taken an undergraduate or graduate research methods course prior to enrolling in both Quantitative and Qualitative Methods.
- ² Students must have taken a statistics course prior to enrolling in Quantitative Methods.
- ³ Courses in this section of electives are for transfer credits, prior thesis, comprehensive study, or technical papers completed as part of a master's degree program or additional electives of the students choice such as didactic courses, seminars, independent study, and/or field research. Students may also take an additional 6 credits from Emergency Management Electives above

- 4 All doctoral students must take a minimum of 3 credits of research practicum. The research practicum can be fulfilled by participating in a member of the faculty's research or by the student conducting his/her own research under the supervision of a faculty member. For every 3 credits of research practicum a student takes the student must submit a manuscript to a scholarly, peer-reviewed emergency management journal by the time they defend their dissertation. Students also must take 3-6 credits of an applied, field-based emergency management practicum; however, students with ample field experience in emergency management may complete additional research practicum credits to fulfill the 9 required practicum credits. The student and his/her advisor will determine how the credits will be fulfilled in this category.

Sarah Bundy, Ph.D.

North Dakota State University, 2013

Research Interests: Comprehensive Emergency Management, Planning, and Development of Emergency Management as an Academic Discipline

Carol Cwiak, J.D., Ph.D.

Western State University, 1995

North Dakota State University, 2009

Research Interests: Preparedness and Mitigation, Business Continuity, Law and Emergency Management

Caroline Hackerott, Ph.D.

Oklahoma State University, 2016

Research Interests: Nonprofit Engagement in Disasters, Teaching and Learning in Emergency Management

Jessica Jensen, Ph.D.

North Dakota State University, 2010

Research Interests: Disaster and Emergency Management Theory, Organization of Society to Address Hazards and Hazard Events (e.g., positions, incident management systems), Development of Emergency Management Higher Education

Daniel J. Klenow, Ph.D.

University of Notre Dame, 1977

Research Interests: Homeland Security, Cybersecurity, Teaching Homeland Security, Emergency Management Theory and Methodology

Engineering

The Doctor of Philosophy in Engineering program is designed to provide the engineering student with a unique opportunity to contribute to the advancement of the engineering profession.

The program addresses the engineering profession's need for mature minds that can translate basic knowledge into practical solutions to the engineering problems associated with our rapidly changing environment. This is accomplished through a unique integration of engineering science within a basic area of concentration.

The Ph.D. program is characterized by an interdisciplinary approach to engineering. Individual doctoral programs for agricultural and biosystems engineering, civil engineering, electrical and computer engineering, industrial and manufacturing engineering, and mechanical engineering provide students with both general knowledge and in-depth understanding of one major area of concentration. Students are able to develop individualized programs of study that emphasize different areas of interest.

Each individualized program consists of three functional areas. The first includes coursework considered to be of special importance to the student's primary progression of study. Second is the concentration area, including specialized coursework contributing to that area. The student's dissertation makes up the third segment of the Ph.D.

Admission Requirements

Contact the College of Engineering for more information.

In consultation with the adviser and student's supervisory committee a Plan of Study would be developed. The Doctor of Philosophy in Engineering program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher.

English

Department Information

- **Department Chair:**
Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
Adam Goldwyn, Ph.D.
- **Department Location:**
318 Minard Hall

- **Department Phone:**
(701) 231-7143
- **Department Web Site:**
www.ndsu.edu/english/ (<http://www.ndsu.edu/english/>)
- **Application Deadline:**
February 1
- **Credential Offered:**
M.A.
- **English Proficiency Requirements:**
TOEFL iBT 100; IELTS 7; PTE Academic 68

Master of Arts

Our program encourages individuality and collaboration as it prepares candidates for academic and non-academic careers. Graduates have gone on to top-tier Ph.D. programs or opted to work in industry or for national and local nonprofits.

Admissions Requirements

Graduate studies in English is open to all qualified applicants who hold a BA or a BS in English or a related field from an accredited college or university.

Financial Assistance

Teaching assistantships are available and are awarded on the basis of the applicant's scholastic record, letters of recommendation, and the student's letter of interest. All applicants that are accepted by the Graduate School in good standing are eligible for an assistantship in the Department of English. Letters of interest (if applicable) for teaching assistantships should be submitted at the same time that the application to the program is submitted to the Graduate School and should address prior experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. University graduate tuition charges (not fees) are waived for all TAs. Moreover, the Department of English annually awards the Richard L. Johnson Endowed Graduate Fellowship, The Rooney Scholarship and the Madeline S. Giddings Scholarship.

The Master of Arts program consists of 27 credit hours of letter-graded course work with an overall GPA of 3.0 or better, and (at least) a 3 credit Master's Paper. Note that ENGL 764 Classroom Strategies For TA'Sis required of all GTAs who have not taken a similar class elsewhere.

Code	Title	Credits
MA Core		9
ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 762	Critical Theory	
Rhetoric/Writing/Linguistics		6
Literature		6
Other/Electives		6
ENGL 797	Master's Paper	3
Total Credits		30

Anastassiya Andrianova, Ph.D.

City University of New York, 2011

Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.

University of Louisville, 2011

Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Sean Burt, Ph.D.

Duke University, 2009

Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Adam Goldwyn, Ph.D.

City University of New York, 2010

Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Amy Gore, Ph.D.

University of New Mexico, 2019

Field: Early Indigenous and American literatures, Book history, Gothic literature, Body studies, and the Recovery of marginalized women and Native American writers

Alison Graham-Bertolini, Ph.D.

Louisiana State University, 2009

Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Holly Hassel, Ph.D.

University of Nebraska-Lincoln, 2002

Field: Writing Program Administration, Writing Assessment, Feminist Pedagogy, Placement, First-Year Writing, The Profession

Linda L. Helstern, Ph.D., Emerita

Southern Illinois University-Carbondale, 2001

Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

Daniel Kenzie, Ph.D., Affiliated Faculty

Purdue University, 2017

Rhetoric & Composition, Professional & Technical Writing, Rhetoric of Health & Medicine, Disability Studies

R.S. Krishnan, Ph.D., Emeritus

University of Nebraska, 1981

Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.

University of Minnesota, 1994

Field: International Technical Communication, Rhetoric and Composition, Linguistics

Mary McCall, Ph.D.

Purdue University, 2017

Rhetoric & Composition, Usability & User Experience, Professional & Technical Writing, Writing Across the Curriculum, Women's, Gender, and Sexuality Studies

Robert O'Connor, Ph.D., Emeritus

Bowling Green State University, 1979

Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.

University of Michigan, Ann Arbor, 2008

Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus

Rensselaer Polytechnic Institute, 1988

Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Verena Theile, Ph.D.

Washington State University, Pullman, 2006

Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.

University of Kansas, 2010

Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Entomology

Department Information

- **Director, School of Natural Resource Sciences:**
Frances Casey, Ph.D.

- **Program Leader:**
Jason Harmon, Ph.D.
- **Email:**
jason.harmon@ndsu.edu
- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
(701) 231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/graduate_degrees/ (http://www.ndsu.edu/snrs/degrees/graduate_degrees/)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Entomology in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work involves specialized training in the following areas: behavior, biochemistry, biodiversity, biological control, chemical ecology, ecology, host plant resistance, insect pathology, pest management, molecular genetics, physiology, and systematics. The Department also participates in interdisciplinary programs in Environmental and Conservation Sciences and Natural Resources Management. The close working relationship between the department and the USDA Red River Valley Agricultural Research Center, located on campus also provides students many opportunities for research and consultation.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to entomological programs are fostered. Prospective students are encouraged to visit <https://www.ndsu.edu/snrs/> to learn more about Entomology and the other degrees offered by the School of Natural Resource Sciences.

The Department of Entomology graduate program is open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must have adequate preparation in entomology and should be in contact with potential faculty advisors about opportunities for new students.

Applications should be submitted directly to the Graduate School and will include a letter stating reasons for pursuing an advanced degree in entomology and expressing the applicant's research interests.

Financial Assistance

All specified application materials must be submitted to the Graduate School, and the student must be admitted in full or conditional standing to be considered for financial assistance. Graduate research assistantships are awarded on the basis of scholarship, potential for advanced study and research, and availability. Graduate research assistantships provide a monthly stipend and a waiver of graduate tuition.

For M.S. candidates, a minimum of 30 semester credits beyond the B.S. and an oral defense of a research-based thesis and academic subject matter is required.

The Ph.D. requires a minimum of 90 semester credits beyond the B.S., (or 60 beyond the M.S. degree), preliminary written and oral examinations directed toward academic subject matter, and a final oral defense of a research-based dissertation.

Mark A. Boetel, Ph.D.

South Dakota State University, 1996

Research Interests: Integrated Pest Management of Sugarbeet and Corn Insects, Microbial Control

Stephen P. Foster, Ph.D.

University of Waikato, 1983

Research Interests: Insect Chemical Ecology, Pheromone Biochemistry, Reproductive Behavior

Jason P. Harmon, Ph.D.

University of Minnesota, 2003

Research Interests: Environmental Change and Ecological Interactions, Biological Control, Insect Ecology

Marion O. Harris, Ph.D., Professor Emeritus

Michigan State University, 1986

Research Interests: Insect Behavior, Insect-Plant Interactions, Resistance of Plants to Insects

Deirdre Prischmann-Voldseth, Ph.D.

Washington State University, 2005

Research Interests: Agricultural Integrated Pest Management and Arthropod Ecology

Darrell Ross, Ph.D.

University of Georgia, 1990

Research Interests: Forest Entomology, Bark Beetle Ecology and Management, Pheromone-Based Management Strategies, Biological Control, Ecological Restoration

David A. Rider, Ph.D.

Louisiana State University, 1988

Research Interests: Systematics of the Pentatomoidea, Molecular Genetics, Ecology of the Northern Tall Grass Prairie Arthropods

Adjunct Faculty

Janet J. Knodel, Ph.D.

North Dakota State University, 2005

Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Environmental and Conservation Sciences

Department Information

- **Program Director:**
Craig Stockwell, Ph.D.
- **Department Location:**
Biological Sciences, Stevens 119
- **Department Phone:**
(701) 231-7717
- **Department Web Site:**
www.ndsu.edu/ecs/ (<http://www.ndsu.edu/ecs/>)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5

Program Description

The graduate program leading to an M.S. or a Ph.D. in Environmental and Conservation Sciences (ECS) rests on an integrative curriculum and a multidisciplinary team approach. The program emphasizes the common ground shared by all sciences, and seeks to bridge methodological and philosophical boundaries that might hinder interdisciplinary communication and cooperation. The program offers three tracks: Environmental Science, Conservation Biology and Environmental Social Sciences. The Environmental Science track focuses on abiotic environmental issues, such as water, air, and land pollution. The Conservation Biology track focuses on biotic issues, such as the preservation of biodiversity and ecosystem function. The Environmental Social Sciences track emphasizes environmental economics and policy.

The interdisciplinary nature of this program is reflected by the participation of faculty from across the campus, including the Colleges of Agriculture, Food Systems, and Natural Resources; Arts, Humanities, and Social Sciences; Engineering; and Science and Mathematics.

Environmental Science

Areas of Environmental Science, such as climate change, groundwater, hazardous waste, and water chemistry, require broad training across discipline lines for successful application. To better predict anthropogenic environmental impacts, the engineering, earth material, chemical, and biological data must be considered in an integrated manner.

Conservation Biology

Conservation Biology focuses on the loss of regional and global biodiversity, but considers the human element as well in its approach to resource issues. As an example, conservation genomics, community ecology, invasion ecology, endangered species management, and human-wildlife conflicts are themes for ECS Graduate Students.

Environmental Social Sciences

Environmental Social Sciences focuses on Natural Resources Economics; Environmental Economics as related to Environmental policy.

Admissions Requirements

To be admitted to the Environmental and Conservation Sciences program, the applicant must meet the Graduate School requirements. Further, applicants are **only considered after an ECS affiliated faculty member has agreed to admit the student to her/his lab and make arrangements of stipend and research funding**. Thus, applicants should contact ECS faculty members who share their research interests. <https://www.ndsu.edu/ecs/index.php/people/faculty> (<https://www.ndsu.edu/ecs/index.php/people/faculty/>)

Financial Assistance

The applicant should contact a prospective mentor to identify sources of financial aid. Teaching and research assistantships may be available through funded research or participating departments. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Contact the office of Financial Aid and Scholarships for information and applications regarding scholarships.

Program Administration

The graduate program is administered by the ECS Steering Committee. The committee is composed of ECS graduate faculty members representing the participating colleges: Agriculture, Food Systems, and Natural Resources; Engineering; and Science and Mathematics. The committee also includes a student member which is nominated annually by the ECS Graduate Student Association.

The ECS Program Director presides over ECS Steering Committee meetings. The duties of the ECS Steering Committee include:

1. review of requests to join the ECS faculty and
2. program review and administration.

By the end of the second semester, the student and academic adviser will arrange for the appointment of a Graduate Supervisory Committee. For Ph.D. study, the Graduate Supervisory Committee will consist of at least four members of the NDSU graduate faculty. The committee must include the student's adviser, two additional ECS faculty members, and a Graduate School representative. One committee member must be from outside the student's home college.

For M.S. study, the Graduate Supervisory Committee will consist of at least three members of the NDSU graduate faculty and will include the student's adviser, an ECS faculty member and a faculty from outside the student's home college. The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence.

Master of Science in Environmental and Conservation Sciences

The total credits will be not less than 30 graduate credits, with at least 16 credits of graduate courses numbered 601-689, 691; 700-789, 791 or 800-889, 891 plus the ECS graduate seminar for 1 credit, and research credits (798) not fewer than 6 nor more than 10 thesis credits. The didactic credits must include at least 1 ECS cross-disciplinary course; 1 ECS track course and UNIV 720 Scientific Integrity. All M.S. students must complete a thesis and pass a final examination as described in The Graduate School Policies section of the Graduate Bulletin. An overall GPA of 3.0 or better must be maintained.

Doctor of Philosophy in Environmental and Conservation Sciences

Each Ph.D. student will complete at least 27 credits of didactic courses plus the ECS graduate seminar for 1 credit. The didactic courses will include: 3 core courses (9 credits), UNIV 720 Scientific Integrity, a minimum of 14-15 credits from a chosen track, and 2-3 credits of electives from another track or other NDSU courses numbered 601-689, 691; 700-789, 791 or 800-889, 891. The 15 track credits must be from at least 2 course categories. Two of the three courses must come from outside of the student's chosen track. Of the 27 didactic course credits, a total of 15 must be at the 700-800 level. A total of 90 credits are required.

For students entering the program with a Master's Degree or previous graduate coursework, up to 12 credits of previous graduate work can transfer and be counted toward the 27 credits. Such transferred credits must be approved by the student's supervisory committee, the program director and the Graduate Dean. The student must earn no fewer than 60 graduate credits at NDSU. Of these, no fewer than 15 credits must be at the 700 or 800 level (700-789, 791; 800-889 and 891).

Program Requirements

Code	Title	Credits
Environmental Social Sciences Track		
ECON 681	Natural Resource Economics	3
ECS 770	Environmental Law and Policy	3
HIST 634	Environmental History	3
or HIST 710	Research Seminar in North American History	
or HIST 780	Readings in World History	
NRM 631	National Environmental Policy Act & Environmental Impact Assessment	3
NRM 702	Natural Resources Management Planning	3
SOC 631	Environmental Sociology	3
Environmental Sciences Track		
CE 770	Hazardous Waste Site Remediation	3
GEOL 614	Hydrogeology	3
MICR 652	Microbial Ecology	3
PH 720	Environmental Health	3
Conservation Biology Track		
BOT 862	Environment and Adaptation	3
BOT 864	Ecological Processes	3
ZOO 675	Conservation Biology	3
ZOO 850	Advanced Conservation Biology	3

CONSERVATIVE BIOLOGY TRACK - TOTAL 18 CREDITS

Code	Title	Credits
Biodiversity		
Select 3-9 credits of the following:		
BIOL 681	Wetland Science	
BOT 717	Aquatic Vascular Plants	
ENT 750	Systematic Entomology	
RNG 716	Agrostology	
ZOO 650	Invertebrate Zoology	
ZOO 652	Ichthyology	
ZOO 654	Herpetology	
ZOO 658	Mammalogy	
Ecology and Evolution		
Select 3-9 credits of the following:		
BIOL 850	Advanced Ecology	
BIOL 859	Evolution	
BOT 660	Plant Ecology	
BOT 862	Environment and Adaptation	
BOT 864	Ecological Processes	
ENT 765	Biological Control of Insects and Weeds	
ENT 770	Writing a Scientific Literature Review	
GEOL 640	Quaternary Biology	
MICR 652	Microbial Ecology	
PLSC 631	Intermediate Genetics	
PLSC 751	Advanced Plant Genetics	
PLSC 781	Quantitative Genetics	
RNG 765	Analysis Of Ecosystems	
SOIL 610	Soils and Land Use	
SOIL 647	Microclimatology	
ZOO 662	Physiological Ecology	
ZOO 670	Limnology	

ZOO 850	Advanced Conservation Biology
ZOO 860	Evolutionary Ecology
ZOO 870	Aquatic Community Ecology

Human Dimensions and Management

Select 3-9 credits of the following:

ANTH 662	Anthropology and the Environment
COMM 783	Advanced Organizational Communication I
CE 678	Water Quality Management
ECON 682	Environmental Economics
POLS 642	Global Policy Issues
POLS 650	Politics of the Developing Countries
RNG 656	Ecological Restoration
ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 677	Wildlife and Fisheries Management Techniques
ZOO 850	Advanced Conservation Biology

Research Tools

Select 3-9 credits of the following:

CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
PLSC 724	Field Design I
PSYC 640	Experimental Methods
RNG 650	Range Plants
SOC 701	Quantitative Methods
SOIL 784	Advanced Soil Genesis, Morphology and Classification
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 730	Biostatistics
STAT 761	Advanced Regression
STAT 770	Survival Analysis

ENVIRONMENTAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Water Sciences		
Select 3-9 credits of the following:		
ABEN 664	Resource Conservation and Irrigation Engineering	
ABEN 765	Small Watershed Hydrology and Modeling	
CE 610	Water & Wastewater Engineering	
CE 677	Applied Hydrology	
CE 676	Watershed Modeling	
CE 678	Water Quality Management	
CE 679	Advanced Water and Wastewater Treatment	
CE 776	Ground Water and Seepage	
CE 779	Watershed Water Quality Modeling	
CE 796	Special Topics	
GEOL 640	Quaternary Biology	

ZOO 670	Limnology
Soil and Solid Waste	
Select 3-9 credits of the following:	
ABEN 696	Special Topics
CE 672	Solid Waste Management
CE 770	Hazardous Waste Site Remediation
SOIL 610	Soils and Land Use
SOIL 633	Soil Ecohydrology and Physics
SOIL 733	Advanced Soil Nutrient Cycling
Environmental Management	
Select 3-9 credits of the following:	
CE 672	Solid Waste Management
CE 678	Water Quality Management
COMM 783	Advanced Organizational Communication I
RNG 656	Ecological Restoration
ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 677	Wildlife and Fisheries Management Techniques
Research Tools	
Select 3-9 credits of the following:	
ABEN 682	Instrumentation & Measurements
ABEN 696	Special Topics
CE 677	Applied Hydrology
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
GEOL 660	Biogeochemistry
GEOL 760	Advanced Biogeochemistry
IME 660	Evaluation of Engineering Data
RNG 650	Range Plants
STAT 662	Introduction to Experimental Design
STAT 725	Applied Statistics
STAT 761	Advanced Regression

ENVIRONMENTAL AND SOCIAL SCIENCES TRACK-TOTAL 17 CREDITS

Code	Title	Credits
Social Science Theory		
Select 3-9 credits of the following:		
AGEC 741	Advanced Microeconomics	
ANTH 680	Development of Anthropological Theory	
COMM 711	Communication Theory	
ECON 640	Game Theory and Strategy	
POLS 720	Theoretical Perspectives to the Study of Political Science	
SOC 622	Development Of Social Theory	
SOC 723	Social Theory	
Cultural and Behavioral Aspects		
Select 3-9 credits of the following:		
AGEC 711	Applied Risk Analysis I	
ANTH 662	Anthropology and the Environment	
ANTH 664	Disaster and Culture	
ECON 656	History of Economic Thought	
ECON 681	Natural Resource Economics	
ECON 682	Environmental Economics	

HIST 634	Environmental History
POLS 642	Global Policy Issues
POLS 653	Environmental Policy and Politics
SOC 631	Environmental Sociology
SOC 639	Social Change
SOC 643	International Disasters

Management Techniques

Select 3-9 credits of the following:

COMM 783	Advanced Organizational Communication I
GEOL 660	Biogeochemistry
NRM 631	National Environmental Policy Act & Environmental Impact Assessment
NRM 632	Environmental Impact Statement
NRM 653	Rangeland Resources Watershed Management
NRM 701	Terrestrial Resources Management
NRM 702	Natural Resources Management Planning
RNG 654	Wetland Resources Management
RNG 656	Ecological Restoration
SOC 604	Community Assessment
TL 755	Context Sensitive Solutions
ZOO 675	Conservation Biology
ZOO 676	Wildlife Ecology and Management
ZOO 850	Advanced Conservation Biology

Research Tools

Select 3-9 credits of the following:

AGEC 701	Research Philosophy
AGEC 739	Analytical Methods for Applied Economics
BIOL 850	Advanced Ecology
COMM 700	Research Methods in Communication
COMM 701	Advanced Research Methods in Communication I
COMM 704	Qualitative Research Methods in Communication
COMM 707	Quantitative Research Methods in Communication
ECON 610	Econometrics
ECON 710	Advanced Econometrics
EMGT 614	Spatial Analysis in Emergency Management
ENGL 656	Literacy, Culture and Identity
ENGL 758	Topics in Rhetoric, Writing, and Culture
GEOG 655	Introduction to Geographic Information Systems
GEOG 656	Advanced Geographic Information Systems
PSYC 640	Experimental Methods
RNG 652	Managing Natural and Rangeland Resources using GIS
RNG 765	Analysis Of Ecosystems
SOC 700	Qualitative Methods
SOC 701	Quantitative Methods
STAT 660	Applied Survey Sampling
STAT 661	Applied Regression Models
STAT 662	Introduction to Experimental Design
STAT 663	Nonparametric Statistics
STAT 665	Meta-Analysis Methods
STAT 670	Statistical SAS Programming
STAT 725	Applied Statistics
STAT 726	Applied Regression and Analysis of Variance
STAT 730	Biostatistics

STAT 761	Advanced Regression
STAT 770	Survival Analysis

Preliminary Examinations for Doctoral Students

The written preliminary examination will cover the core areas for ECS and each of the core topic areas for the appropriate track. The preliminary examination will typically be taken in the middle of the third year. The written exam must be passed before the comprehensive oral examination can be scheduled.

The comprehensive oral examination will be taken no later than the end of the third year in residence. The examination will cover the topic areas for the appropriate track.

Dissertation Research

A proposal describing research suitable for preparation of a dissertation in Environmental and Conservation Sciences will be prepared in the format of a NSF Dissertation Improvement Grant. Alternative formats must be agreed to by the Graduate Supervisory Committee. The proposal will be submitted to the student's Graduate Supervisory Committee for review and approval. The dissertation must show originality and demonstrate the student's capacity for independent research.

Bakr Aly Ahmed, Ph.D.

Virginia Tech, 2001

Research Interests: Built Environment; Sustainable Architecture; Construction Technology; Urban Sustainability

Laura Aldrich-Wolfe, Ph.D.

Cornell University, 2006

Research Interests: Restoration Ecology; Conservation Biology; Fungal Community Ecology

F. Adnan Akyuz, Ph.D.

University of Missouri-Columbia, 1994

Research Interests: Applied Climatology and Microclimatology/Climate Based Agriculture

Allan C. Ashworth, Ph.D.

University of Birmingham, 1969

Research Interests: Quaternary Paleoecology, Paleoclimatology

Achintya Bezbaruah, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Nanomaterials for Pollution Control, Recalcitrant and Micro Pollutants, Contaminant Fate and Transport, Small Community Water and Wastewater Treatment, Environmental Sensors, Environmental Management

Julia Bowsher, Ph.D.

Duke University, 2007

Research Interests: Evolutionary and Developmental Biology

Igathinathane Cannayen, Ph.D.

Indian Institute of Technology, 1997

Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

Frank X.M. Casey, Ph.D.

Iowa State University, 2000

Research Interests: Field and Laboratory Studies of Water Flow and Chemical Transport Processes

Amitava Chatterjee, Ph.D.

University of Wyoming, 2007

Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Xuefeng (Michael) Chu, Ph. D.

University of California, Davis, 2002

Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Larry Cihacek, Ph.D.

Iowa State University, 1979

Research Interests: Carbon Sequestration in Soils, Soil Physical Properties, Soil Management for Waste Disposal

Dennis Cooley, Ph.D.

University of Rochester, 1995

Research Interests: Ethics of Science

Aaron Daigh, Ph.D.

Iowa State University, 2013

Research Interests: Soil Physics, Transport in Soils, Soil Residue and Water Management, Crop Rotations, and Nutrient/Agrochemical/Industrial Byproduct Soil Amendment Impacts on Soil Physical Properties

Stephanie Day, Ph.D.

University of Minnesota, 2012

Research Interests: Fluvial Geomorphology, Slope Stability, Geospatial Sciences

Edward (Shawn) DeKeyser, Ph.D.

North Dakota State University, 2000

Research Interests: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie Restoration

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Educational Technology, Model Building, Databases

Thomas M. DeSutter, Ph.D.

Kansas State University, 2004

Research Interest: Trace Gas Fluxes, Inorganic Soil Chemistry, Soil Environmental Conditions

Ned Dochtermann, Ph.D.

University of Nevada, Reno, 2009

Research Interests: Ecological and Evolutionary Causes and Consequences of Phenotypic Variation

Paulo Flores, Ph.D.

Federal University of Rio Grande do Sul, 2008

Research Interests: Precision Agriculture, Unmanned Aerial Systems; Imagery analyses

Caley Gasch, Ph.D.

University of Wyoming, 2013

Research Interests: Soil ecology; Restoration; Conservation

Erin Gillam, Ph.D.

University of Tennessee, 2007

Research Interests: Behavioral ecology of bats, ecological and evolutionary basis of behavior in all animal groups, behavioral, ecological, and evolutionary factors influence the structure of animal communication signals and wildlife ecology and conservation.

Kendra Greenlee, Ph.D.

Arizona State University-Tempe, 2004

Research interests: Environmental and respiratory physiology of insects; insect immunology.

Timothy Greives, Ph.D.

Indiana University, 2009

Research Interests: Physiology and Behavior of Animals in Response to Environmental Signals

Ademola (Demmy) Hammed, Ph.D.

International Islamic University, 2014

Research Interests: Biotechnology Engineering; Agricultural Bioproducts

Jason Harmon, Ph.D.

University of Minnesota, 2003

Research Interests: Environmental change; ecosystem services; population and community ecology

Mark Harvey, Ph.D.

University of Wyoming, 1986

Research Interests: American West, Environmental History, Public History

Harlene Hatterman-Valenti, Ph.D.

Iowa state University, 1993

Research Interests: High-Value Crop Production

Robert R. Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Economic Analysis of Emerging Environmental and Resource Issues in the Northern Great Plains

Britt Heidinger, Ph.D.

Indiana University, 2007

Research Interests: Physiological Ecology, Senescence, Stress Physiology

David Hopkins, Ph.D.

North Dakota State University, 1997

Research Interests: Soil Formation and Chemistry

Tom Isern, Ph.D.

Oklahoma State University, 1977

Research Interests: History of Agriculture, History of Great Plains

Sivaguru Jayaraman, Ph.D.

Tulane University, 2003

Research Interests: Photocatalysis, Photochemistry, Green Chemistry

Xinhua Jia, Ph.D.

University of Arizona, 2004

Research Interests: Evapotranspiration, Subsurface drainage and Water quality

Dinesh Katti, Ph.D.

University of Arizona, 1991

Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bio-nanocomposites. Computational Biophysics

Page Klug, Ph.D.

Kansas State University, 2009

Research Interests: Human-wildlife Interactions; Ecology; Birds; Snakes

Ben Laabs, Ph.D.

University of Wisconsin, 1999

Research Interests: Quaternary Geology; Glacial Geology; Cosmogenic Nuclides; Paleoclimate; Surface Processes

Trung Le, Ph.D.

University of Minnesota, 2011

Research Interests: Hydraulics; Fluid Mechanics; Numerical Methods For Fluid-Structure Interaction

Kenneth E. Lepper, Ph.D.

Oklahoma State University, 2001

Research Interests: Quaternary Geology and Age Dating

Wei Lin, Ph.D.

State University of New York at Buffalo, 1992

Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

Zhulu Lin, Ph.D.

University of Georgia, 2003

Research Interests: Surface and Subsurface Hydrology and Modeling, Soil and Water Resources Management, Environmental Systems Analysis, Risk Identifications and Assessment, Geostatistics and Spatial Statistics

Guodong Liu, Ph.D.

Hunan University, 2001

Research Interests: Synthesis of Novel Nanomaterials, Biosensors, Bioassays

John McEvoy, Ph.D.

University of Ulster Northern Ireland, 2002

Research Interests: Cryptosporidium Virulence Factors and Mechanisms of Pathogenesis

Jennifer Momsen, Ph.D.

Rutgers University, 2007

Research Interests: Biology Education, Systems Thinking in Introductory Biology, Visualization, Assessing the Cognitive Level of STEM Courses

Bakr Mourad Aly Ahmed, Ph.D.

Virginia Tech., 2001

Research Interests: Sustainability Indicators and Implementation, Carrying Capacity Measurements, Coastal Development, Built Environment and Natural Resources Conservation

Jack Norland, Ph.D.

North Dakota State University, 2008

Research Interests: Restoration Ecology, Application of Remote Sensing to Natural Resource Management, Study of Natural Resources Management Problems in a Socio-ecological Setting

Nurun Nahar, Ph.D.

North Dakota State University, 2017

Research Interests: Biomass Conversion; Bioprocess Engineering; Biofuels

Peter Oduor, Ph.D.

University of Missouri - Rolla, 2004

Research Interests: Geographic Information Systems, Groundwater Flow Modeling, Groundwater Contamination

Marinus Otte, Ph.D.

Vrije Universiteit, 1991

Research Interests: Wetland ecology, Biogeochemistry, Ecophysiology and Ecotoxicology

Birgit Pruess, Ph.D.

Ruhr- Universitat Bochum, 1991

Research Interest: Microbial Physiology and Gene Regulation

Scott Pryor, Ph.D.

Cornell University, 2005

Research Interests: Biofuel Production from Cellulosic Feedstocks, Biobased Chemicals and Materials, Bioprocess Engineering, Process Optimization, Solid State and Liquid Fermentation Systems

Shafiqur Rahman, Ph.D.

University of Manitoba, 2004

Research Interests: Animal Waste Management, Biosolids Management, Air Quality, Water Quality, Composting

David A. Rider, Ph.D.

Louisiana State University, 1988

Research Interests: Insect Systematics, Biodiversity

David Ripplinger, Ph.D.

North Dakota State University, 2012

Research Interests: Energy Transport; Agricultural Economics

David C. Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Evaluation and Design of Economically Efficient Tools and Policies for Pollution Control, Economic Valuation of Environmental and Ecological Attributes Through Revealed and Stated Preference Methods, Valuation of Environmental Risk, and Low-Impact and Precision Agriculture

Bernhardt Saini-Eidukat, Ph.D.

University of Minnesota, 1991

Research Interests: Environmental Geochemistry, Igneous Petrology, Economic Geology

Kalidas Shetty, Ph.D.

University of Idaho, 1989

Research Interests: Plant Science; Agriculture; Food Science; Human Nutrition; Public Health

Halis Simsek, Ph.D.

North Dakota State University, 2012

Research Interests: Bioenvironmental Engineering

Senay Simsek, Ph.D.

North Dakota State University, 2012

Research Interests: Bioenvironmental Engineering; Carbohydrate Chemistry; Cereal Science; Food Science And Technology

Todd Sirotiak, Ph.D.

Iowa State University

Research Interests: Construction Process Improvement; Sustainability

Matt Smith, Ph.D.

University Of Arkansas, 2012

Research Interests: Morphology; Physiological Ecology

Dean D. Steele, Ph.D.

University of Minnesota, 1991

Research Interests: Irrigation and Environmental Engineering

Craig A. Stockwell, Ph.D.

University of Nevada, 1995

Research Interests: Conservation Biology, Evolutionary Ecology of Native Fishes, Human-Wildlife Interactions

Linda Tackett, Ph.D.

University of Southern California, 2014

Research Interests: Norian (and Mesozoic, generally) Paleocological, Taxonomic, and Environmental Dynamics

Steve E. Travers, Ph.D.

University of California, 1998

Research Interests: Plant Evolutionary Ecology

Cheryl Wachenheim, Ph.D.

Michigan State University, 1994

Research Interests: Eliciting Perceptions and Valuations from Consumers, Firms, Students and Other Stakeholders and Decision Makers

Alexander Wagner, Ph.D.

Oxford University, 1997

Research Interests: Lattice Boltzmann, Spinodal Decomposition, Viscoelasticity, Drop Deformation and Break-up in a Shear Flow, Wetting, Non-equilibrium Thermodynamics, Complex systems

Scott Wood, Ph.D.

Princeton University, 1985

Research Interests: Environmental Geochemistry, Radioactive Waste Disposal

Brian D. Wisenden, Ph.D.

University of Western Ontario, 1993

Research interests: Behavioral Ecology of Fishes, Chemical Ecology of Predator-Prey Interactions, Parental Care and Mating Systems

Environmental Engineering

Department Information

- **Interim Department Chair:**
Xuefeng (Michael) Chu, Ph.D.
 - **Graduate Program Coordinator:**
Kalpana Katti, Ph.D.
 - **Department Location:**
201 Civil and Industrial Engineering Bldg.
 - **Department Phone:**
(701) 231-7244
 - **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
 - **Credential Offered:**
M.S.
 - **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6
-

Program Description

The Department of Civil and Environmental Engineering offers the M.S. degree in environmental engineering and M.S. and Ph.D. degrees in civil engineering. Also, the College of Engineering offers a program leading to a Ph.D. degree in engineering in which civil engineering is a possible area of specialization. The department also participates in several interdisciplinary programs such as Environmental and Conservation Sciences, Materials & Nanotechnology and Transportation and Logistics.

The graduate curriculum in environmental engineering offers courses designed to prepare the student with engineering fundamentals as applied to the environment. To complement the major area of study, additional courses are often selected from other disciplines. Students without a B.S. degree in civil engineering will take remedial undergraduate courses to gain an appropriate background in civil engineering.

Admissions Requirements

To be admitted to the graduate Master of Science program in environmental engineering, the applicant must meet the Graduate School requirements (p. 975).

Financial Assistance

Research and/or teaching assistantships may be available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference (and TOEFL results for international applicants) must be submitted to The Graduate School. Additional eligibility requirements for teaching assistantships can be found on the Graduate School website.

The Master of Science degree thesis is a scholarly document prepared by the student which is based on research performed. The research topic is chosen by the student in consultation with his or her adviser. The student and adviser together prepare a plan of study to meet the needs of the individual student. The program contains a minimum of 30 credits of graduate-level material, of which the thesis can count 6 to 10 credits. An overall GPA of 3.0 or better must be maintained. An oral defense of the research-based thesis and comprehensive academic subject matter is required.

A student entering the environmental engineering Master of Science degree program without an undergraduate engineering degree will be required to satisfy the undergraduate requirements for mathematics, basic science, and engineering sciences in addition to the Master of Science requirements.

Achintya N. Bezbaruah, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Xuefeng (Michael) Chu, Ph.D.

University of California, Davis, 2002

Research Interests: Watershed Hydrologic and Environmental Modeling, Overland Flow and Infiltration, Integrated Modeling of Flow and Contaminant Transport

Wei Lin, Ph.D.

State University of New York at Buffalo, 1992

Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

G. Padmanabhan, Ph.D. (Emeritus)

Purdue University, 1980

Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Eakalak Khan, Ph.D. (adjunct)

University of California, Los Angeles, 1997

Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Robert Zimmerman, Ph.D. (adjunct)

North Dakota State University, 1991

Research Interests: Water and Wastewater Treatment, Solid Waste

Exercise Science and Nutrition

Department Information

- **Program Director:**
Kyle Hackney, Ph.D.
- **Department Location:**
Bentson Bunker Fieldhouse

- **Department Phone:**
(701)231-6737
- **Department Web Site:**
www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/ (http://www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/)
- **Application Deadline:**
Applications that are complete by March 15 will be given priority for fall semester. Applications completed after March 15 will be reviewed through May 1 for consideration for fall semester.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibt 79; IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a Doctorate of Philosophy (PhD) program in Exercise Science and Nutrition (https://www.ndsu.edu/hnes/graduate_programs/phd_in_exercise_science_and_nutrition/). Exercise Science and Nutrition are traditionally separate disciplines that strive to improve human health or human performance. Combined, the two form a strong and natural approach to improve well-being. Exercise Science and Nutrition includes the study of energy systems, nutrient intake, behavior motivation, and the physiology and mechanics of movement. Faculty are scholars in community nutrition, nutrition across the lifespan, clinical nutrition, exercise science, biomechanics, and physical activity and health.

Program Objectives

The purpose of the PhD program is to train doctoral students in Exercise Science and Nutrition for future careers in industry and academia. The program requires coursework and scholarly activities that will produce professionals with strong skills in research, teaching, grant writing, and service who will be competitive and productive in their careers. These professionals will have a strong understanding of both Exercise Science and Nutrition that will enable them to assume positions of leadership in research and teaching in community, government, university or other professional agencies and organizations.

Professional Knowledge. Students understand disciplinary content knowledge and apply such knowledge in the field of exercise science and/or nutrition.

Scientific Inquiry and Research Skills. Students understand modes of scientific inquiry and develop research skills to answer questions in the disciplines of exercise and/or nutrition.

Professionalism. Students gain leadership experiences and obtain career-oriented credential(s) in exercise science and/or nutrition.

Career Opportunities

A PhD in Exercise Science and Nutrition offers a wide array of career opportunities. Graduates of the program can expect to work for governmental and human service agencies, for-profit and not-for-profit research organizations, as well as in university-level education and research positions. A unique and attractive aspect to this degree is that it can prepare students to work in either nutrition or exercise science academic units upon graduation. Graduates of this program are equipped to meet the needs of changing regional, national, and global populations as related to their health and well-being.

Admission Requirements

Of the qualified PhD applicants we receive, we expect to admit up to five students per year, based on the capacity of our current faculty. In addition to the core faculty members in HNES who will advise students and participate in this program, there are faculty inside and outside of the department whose research interests mesh well with the program.

Applicants with a Master's degree:

- Completion of a Master's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative graduate GPA of 3.00 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one graduate course in statistics and one course in research methods, with grades of B or higher in each.

- A completed thesis or research paper.
- Agreement to be advised by current HNES graduate faculty member.

Applicants without an earned Master's degree:

- Completion of a Bachelor's degree from an accredited university in a field closely related to Nutrition, Health, Dietetics, Kinesiology, or Exercise Science.
- Cumulative undergraduate GPA of 3.0 or higher.
- GRE exam scores in the upper 50th percentile for the Verbal, Quantitative, and Writing portions are given priority admission.
- At least one statistics course or research methods course with grades of B or higher.
- Agreement to be advised by current HNES graduate faculty member.

Financial Assistance

Graduate Assistantships are available for up to 20 hours a week based on faculty need and available funding. Assistantships are renewable on a yearly basis dependent upon student performance. Assistantship awards also include full tuition remission regardless of residency. Students are typically provided shared offices, computers, and access to printers, and support staff. Assistantships typically begin the week before fall semester classes and continue through finals week of spring semester. Summer is not included in most assistantship awards.

Students Entering with a Master's Degree

Code	Title	Credits
Research Core		12
STAT 725	Applied Statistics	
9 additional credits in statistics and research methodology		
Recommended HNES Core		9
HNES 713	Graduate Exercise Physiology	
HNES 726	Nutrition in Wellness	
HNES 777	Scholarly Writing and Presenting in HNES	
Electives (up to 6 credits outside of HNES)		18
HNES 727	Physical Activity Epidemiology	
HNES 652	Nutrition, Health and Aging	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 710	Introduction to Research Design and Methods in HNES	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 735	Nutrition and Human Performance	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 762	Exercise Endocrinology	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (minimum of 3 credits)		3-6
HNES 894	Practicum/Internship	
Teaching Experience (minimum of 3 credits)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two separate semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		60

Students Entering with a Bachelor's Degree

Code	Title	Credits
Research Core		21
STAT 725	Applied Statistics	
HNES 710	Introduction to Research Design and Methods in HNES	
12 additional credits in statistics and research methodology		
Recommended HNES Core		9
HNES 713	Graduate Exercise Physiology	
HNES 726	Nutrition in Wellness	
HNES 777	Scholarly Writing and Presenting in HNES	
Electives (up to 6 credits outside of HNES)		33
HNES 727	Physical Activity Epidemiology	
HNES 652	Nutrition, Health and Aging	
HNES 735	Nutrition and Human Performance	
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 704	Psychological Foundation of Sport & Physical Activity	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise Science	
HNES 762	Exercise Endocrinology	
HNES 790	Graduate Seminar	
HNES 791	Temporary/Trial Topics	
Research Practicum (9-12 credits)		9-12
HNES 894	Practicum/Internship	
Teaching Experience (3-6 credits)		3-6
HNES 892	Graduate Teaching Experience	
Dissertation (must encompass at least two semesters)		15
HNES 899	Doctoral Dissertation	
Total Credits (minimum)		90

Bryan Christensen, Ph.D.

University of Kansas, 2000

Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.

Ohio University, 2013

Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Joe Deutsch, Ph.D.

North Dakota State University, 2007

Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Marty Douglas, Ph.D.

Michigan State University, 2009

Research Interests: Adapted Physical Activity

Julie Garden-Robinson, Ph.D.

North Dakota State University, 1994

Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Kyle Hackney, Ph.D, CSCS, CCD.

Syracuse University, 2013

Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids, Sports Performance

Elizabeth Hilliard, Ph.D.

North Dakota State University, 2018

Research Interests: Breastfeeding Support and Promotion in the Workplace, and Infant and Child Feeding Practices

Jenny Linker, Ph.D.

University of Illinois Urbana-Champaign, 2011

Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Ryan McGrath, Ph.D.

University of Idaho, 2015

Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.

Oklahoma State University, 1999

Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.

North Dakota State University, 2007

Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.

University of New Mexico, 1988

Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.

The Ohio State University, 1982

Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

Extension Education

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Program Coordinator:**
Jeanette Hoffman, Ph.D.
- **Department Location:**
School of Education, FLC 210
- **Department Phone:**
(701) 231-7921
- **Application Deadline:**
March 15 for summer and fall admission; October 15 for spring admission.
- **Credential Offered:**
M.Ed., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

Extension Education offers graduate study leading to the M.S. and M.Ed. degrees. Specialized training in an area of interest is required.

Admission Requirements

In addition to the Graduate School's required application materials, the program requires:

- 1) a statement of purpose that addresses the question, "How will this degree help me achieve my professional goals?"
- 2) a letter from a faculty member/specialist expressing their willingness and ability to mentor the candidate in their area of interest.

Admission is only considered after all required application materials have been received and reviewed.

This program requires completion of a minimum of 31 credits.

Code	Title	Credits
Core Courses		13
H&CE 646	Extension Education	
H&CE 724	Program Development In Vocational Education	
H&CE 756	Program Development and Evaluation	
EDUC 750	Reflective Practice and Research in Education	
EDUC 851	Adult Learning (or EDUC 882 or EDUC 853)	
Research Methods		6
EDUC 702	Statistics In Educational Research	
or STAT 725	Applied Statistics	
EDUC 883	Survey Research (or similar)	
Major/Concentration*		6
Capstone		6
H&CE 798	Master's Thesis (M.S. degree students)	
H&CE 794	Practicum/Internship (Action Research/Creative Project - M.Ed. degree students)	
Total Credits		31

Adam A. Marx, Ph.D.

University of Missouri, 2014

Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

David Ripplinger, Ph.D.

North Dakota State University, 2011

Research Interests: Production Economics and Marketing

Brooke Thiel, Ph.D.

North Dakota State University, 2020

Research Interests: Career Readiness, 21st Century Skills, Teacher Development

Family and Consumer Science Education

Department Information

- **School of Education Head:**
Chris Ray, Ph.D.
- **Graduate Coordinator:**
Mari Borr, Ph.D.
- **Department Location:**
School of Education, FLC 210
- **Department Phone:**
(701) 231-7921
- **Application Deadline:**
March 15 for summer and fall admission; October 15 for spring admission.
- **Credential Offered:**
M.S., M.Ed.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

Students have the option of pursuing a Master of Education (M.Ed.) or Master of Sciences (M.S.) degree in Family and Consumer Sciences Education. Advanced work may be taken in FCSE, Career and Technical Education, Extension, and curriculum design and development.

The NDSU programs in education are accredited by National Council for Accreditation of Teacher Education and are approved by the ND Education Standards and Practices Board. Changes in national and state legislation, standards, or rules can affect academic program requirements.

Option A

This program is designed for a person who already has a bachelor's degree in a Family and Consumer Sciences related area and would like to work toward obtaining a teaching license. Upon completion, the program provides the pedagogy requirements that may lead to a Family and Consumer Sciences teaching certificate. Depending on the individual's bachelor's degree, there will most likely be several content courses that will need to be taken as well to meet licensing requirements. Licensing also involves state mandated tests. Student teaching is included in this program. This program is offered through the Great Plains Interactive Distance Education Alliance. All courses in this master's degree are offered online and are taught by faculty at several different universities. For more information, please see: <https://www.gpidea.org/program/family-consumer-sciences-education> (<https://www.gpidea.org/program/family-consumer-sciences-education/>).

NOTE: Earning an academic/professional degree does not necessarily lead to state credential or licensure. People seeking licensure may need to meet additional requirements such as tests and additional coursework. Potential and current students should consult with the appropriate academic program coordinator for advice about licensure, certification, or credentialing after communicating with the appropriate state official.

Option B

This program is designed to provide persons who currently hold a teaching degree in Family and Consumer Sciences with an expanded background in Family and Consumer Sciences Education and related content areas. It also examines the broader field of education, with a solid foundation in research methodology. Students are encouraged to complete additional course work in areas of interest. Internships can be incorporated into the program of study and provide an opportunity for students to examine current issues. Candidates should work closely with an adviser.

Qualified students may apply for admission to graduate programs in the School of Education leading to Master of Education (M.Ed.) or Master of Science (M.S.) degrees.

Those applying to Option A, in addition to the Graduate School's required application materials, need to hold a bachelor's degree in a FCS-related area and pass the Praxis Core Academic Skills exam, meeting ND cut scores in reading, writing and math. See <http://www.ets.org/> for additional information and to register for the exam. They will also need to compose a 400-500 word original essay that answers the following questions: What are your reasons for applying to the Teacher Licensure program? How does your 20 hours working with youth supports your decision to apply to the Teacher Licensure option? The applicant must have at least a 3.0 undergraduate GPA, submit all transcripts, and submit letters of recommendation.

For those applying to Option B, in addition to the Graduate School's required application materials, the program requires submission of a statement of career goals consistent with the five propositions of the National Board of Professional Teaching Standards (NBPTS), <http://www.nbpts.org/> as well as reasons for applying to the program. The School of Education reserves the right to obtain additional information about the student's professional competence from qualified professionals. The applicant must have at least a 3.0 undergraduate GPA, submit all transcripts, and submit letters of recommendation.

Admission is considered only after all required application materials have been received and reviewed. Where appropriate, all international student requirements must be met.

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission.

Financial Assistance

Graduate assistantships are available in the School of Education. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. Students must be accepted into the Graduate School before they are eligible for an assistantship.

All enrollments in Education courses before the student files a graduate plan of study must be approved by the adviser. The School of Education will evaluate graduate courses taken prior to filing the graduate plan of study when the student's plan of study is being considered. Only those courses approved by the School of Education may be included on the final plan of study leading to the degree.

Master's programs within the School of Education require a minimum of 30 semester credits (minimums vary by academic program). The Master of Science (M.S.) degree requires a disquisition. The Master of Education (M.Ed.) degree is a non-disquisition, practitioner-oriented degree. Programs vary on requiring a written comprehensive exam or a portfolio/oral.

Option A Program (Master of Education)

Code	Title	Credits
Education Courses		9
EDUC 751	Students and Their Learning	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
EDUC 775	Content Area Reading	
Major Concentration		21
H&CE 668	Methods of Teaching Family and Consumer Sciences I: Techniques	

H&CE 682P	Methods of Teaching Family and Consumer Sciences II: Professional Practices	
H&CE 740	Vocational Philosophy and Policy	
H&CE 771	Human Relations for Educators	
H&CE 773	Occupational Programs in Family and Consumer Science	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences	
Field Experiences		11
H&CE 687P	Student Teaching	
H&CE 794	Practicum/Internship (with H&CE 668 & H&CE 682P)	
Total Credits		41

Option B Program (Master of Science or Master of Education)

Code	Title	Credits
Core Courses		15
EDUC 750	Reflective Practice and Research in Education	3
EDUC 751	Students and Their Learning	3
EDUC 752	Curriculum Design and Delivery	3
EDUC 753	Managing/ and Monitoring Learning	3
EDUC 702	Statistics In Educational Research	3
Major/Concentration		15-24
Choose from the following:		
H&CE 667	Advising Family, Career, and Community Leaders of America	
EDUC 775	Content Area Reading	
H&CE 724	Program Development In Vocational Education (non -GPIDEA only)	
H&CE 740	Vocational Philosophy and Policy	
H&CE 772	Curriculum Development in Family and Consumer Sciences	
H&CE 773	Occupational Programs in Family and Consumer Science (through GPIDEA only)	
H&CE 774	Teaching Family and Consumer Science with Technology	
H&CE 776	Research Design in Family and Consumer Sciences (through GPIDEA only)	
H&CE 777	Evaluation in Family and Consumer Sciences (through GPIDEA only)	
H&CE 778	Administration of Family and Consumer Sciences Programs (through GPIDEA only)	
H&CE 779	Techniques of Supervision in Family and Consumer Sciences (through GPIDEA only)	
H&CE 787	Issues In Education	
H&CE 790	Graduate Seminar	
H&CE 795	Field Experience	
Research Paper (as approved by adviser)		3-10
H&CE 794	Practicum/Internship (Action Research)	
H&CE 798	Master's Thesis	6-10
Total Credits		33-49

Mari Borr, Ph.D.

University of North Dakota, 2005

Research Interests: Qualitative Research, Family and Consumer Science Education, Adolescent Development, Experiential Learning, and Professional Development Evaluation

Genomics, Phenomics and Bioinformatics

Department Information

- **Program Director:**
Phillip McClean, Ph.D.
- **Email:**
Phillip.McClean@ndsu.edu
- **Department Location:**

Plant Sciences, Loftsgard Hall

- **Department Phone:**

(701) 231-8443

- **Application Deadline:**

International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.

- **Credential Offered:**

Ph.D., M.S.

- **English Proficiency Requirements:**

TOEFL iBT 71, IELTS 6

Genomics, Phenomics and Bioinformatics is an interdisciplinary graduate program that involves around 30 faculty from six departments and three colleges. The program initially focused on Genomics and Bioinformatics. In 2021, the program underwent a major change. This was prompted by advances in high-throughput phenotyping, and the growing importance of phenomics data and its direct relationship to genes controlling traits. Based on those relations, phenomics was added as another research track.

Students in the program will perform advanced study, training and research in areas that focus on functional genomics, high-throughput phenotyping, and computation analysis of genomic and phenomic data. This will lead to an understanding of the many -omics fields interact to understand how a phenotype is expressed.

The program is designed to provide both Master of Science (M.S.) and Doctor of Philosophy (Ph.D.) students the necessary skills and intellectual background to work cooperatively with others in a research areas that take systems-wide approach to the study of the organization and expression of the many genes and their products expressed in an organism. Exposure to modern techniques and instrumentation will prepare the student for success in both industrial and academic careers.

Students can obtain a M.S. or Ph.D. in either the functional genomics, bioinformatics, or phenotypics tracks. Comprehensive options are available for all three tracks for M.S. students.

It is the intent of the program to admit students in one of three tracks. The Functional Genomics track will be for students interested in the generation and application of genomic information. The Computational Bioinformatics track is intended for students interested in using computer science and statistical approaches to analyze large amounts of genomic data. The Phenomics track will be attractive to students interested in the application of high-throughput equipment to measure important traits necessary for full expression of the traits necessary for the organism to productively complete its life cycle.

The Genomics graduate program is open to qualified graduates of universities of recognized standing. The Graduate School minimum for the TOEFL examination applies. In addition, the following are the requirements to be admitted with full standing.

Functional Genomics track: a Bachelor of Science (B.S.) degree an introductory biology class emphasizing molecular biology; with courses in genetics, physiology, biochemistry; an upper-division statistics class. A minimum undergraduate GPA of 3.0.

Bioinformatics and Phenomics tracks: a B.S. degree with an introductory biology class emphasizing molecular biology; with courses in calculus, upper-division statistics class, calculus or matrix algebra, and programming language experience. A minimum undergraduate GPA of 3.0.

Students can be accepted conditionally into any track without meeting the course or GPA requirements, but will be required to meet those requirements while in residency.

Adviser and Graduate Committee

During the first year, the student will form a graduate committee and submit the Plan of Study to the Graduate School. The committee must include the student's major adviser, at least one other faculty member of the Genomics, Phenomics, and Bioinformatics program, and a third member from outside the student's home college. For Ph.D. students only, a fourth member of the committee serves as the Graduate School Representative (GSR). The GSR must be a full member of the graduate faculty, AND be either a tenured faculty member outside the committee chair's/co-chairs' home department(s) OR a faculty member outside the primary college of the committee chair/co-chairs. For this interdisciplinary program, the GSR must ALSO be outside of the program. Additionally, the GSR must be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair.

Master's Program

Code	Title	Credits
Functional Genomics - Thesis Option		
Core Courses		

PLSC 611	Genomics	3
CSCI/MATH/STAT 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (BIOC 674 is 3 credits)	2
or BIOC 674	Methods of Recombinant DNA Technology	
796 Current Topics in Genomics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives - At least one course from two of the following elective areas: Physiology, Gene Expression, Genetics and Genomics		9
798 Master's Thesis (6-10)		
Total Credits		30

Code	Title	Credits
Functional Genomics Comprehensive Study Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (or)	2
BIOC 674	Methods of Recombinant DNA Technology	3
796 Current Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives - At least one course from each of the following elective areas: Physiology, Gene Expression, Genetics and Genomics		
797 Master's Paper		4
Total Credits		30

Code	Title	Credits
Bioinformatics - Thesis Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, two semesters)		2
790 Graduate Seminar		1
Electives - Computer Science, Statistics, Computational Biology		9
798 Master's Thesis		6-10
Total Credits		30

Code	Title	Credits
Bioinformatics Comprehensive Study Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1
Electives - From the Computer Science, Statistics, Computational Biology elective areas		15
797 Master's Paper		4
Total Credits		30

Code	Title	Credits
Phenomics Thesis Option		
CSCI 679	Introduction to Data Mining	3
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
Physiology Elective		3
796 Special Topics (1 credit, 2 semesters)		2
790 Graduate Seminar		1

Electives - At least one course from the Modling and Sensing and Computer Science, Statistics, and Computational Biology elective areas	9
798 Master's Thesis	6-10
Total Credits	30

Code	Title	Credits
Physiology Electives		
ANSC 663	Physiology of Reproduction	3
BIOL 660	Animal Physiology	3
BIOL 662	Physiological Ecology	3
BIOL 664	Endocrinology	3
BIOL 683	Cellular Mechanisms of Disease	3
BIOL 825	Biology of Aging	3
BIOL 861	Advanced Physiology - Physiology of Extremes	3
MICR 650	Infectious Disease Pathogenesis	3
MICR 680	Microbial Physiology	3
PPTH 751	Physiology Of Plant Disease	3
PLSC 686	Applied Crop Physiology	3
PLSC 750	Crop Stress Physiology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
Gene Expression		
BIOC 660	Foundations of Biochemistry and Molecular Biology I	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 682	Developmental Biology	3
BIOL 820	Advanced Cell Biology	
MICR 775	Molecular Virology	3
PLSC 731	Plant Molecular Genetics	3
Genetics and Genomics Electives		
ANSC 657	Genetic Improvement of Livestock	3
ANSC 750	Quantitative Genetics Applications of Matrix Algebra	1
ANSC 751	A Primer to Quantitative Genetics	1
ANSC 752	Selection Index Theory and Application	1
BIOL 679	Biomedical Genetics and Genomics	3
BIOL 859	Evolution	3
BIOL 860	Evolutionary Ecology	3
BIOL 862	Environment and Adaptation	3
MICR 681	Microbial Genomics with Computational Laboratory	3
MICR 682	Microbial Genetics	3
MICR 783	Advanced Bacterial Genetics and Phage	3
PLSC 631	Intermediate Genetics (required for Functional Genomics Option)	3
PLSC 741	Cytogenetics	4
PLSC 751	Advanced Plant Genetics	3
PLSC 782	Population and Quantitative Genetics	
PPTH 755	Population Biology of Plant Pathogens	3
PPTH 759	Host-Parasite Genetics	3
PSCI 617	Pharmacogenomics	2
Computer Science, Statistics, and Computational Biology Electives		
ANSC 850	Linear Models in Animal Breeding	1
ANSC 851	Genetic Prediction	1
ANSC 852	Applied Variance Component Estimation	1

ANSC 856	Prediction and Control of Inbreeding in Breeding Programs	1
BIOL 842	Quantitative Biology	3
BIOL 877	Analysis of Population and Demographic Data	3
CSCI 679	Introduction to Data Mining	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 736	Advanced Intelligent Systems	3
CSCI 765	Introduction To Database Systems	3
CSCI 879	Advanced Data Mining	3
MATH 630	Graph Theory	3
MATH 636	Combinatorics	3
MATH 684	Mathematical Methods of Biological Processes	3
MATH 830	Graph Theory	3
MATH 839	Topics in Combinatorics and Discrete Mathematics	3
MATH 867	Topics in Applied Mathematics	3
MICR 724	Applied Epidemiology and Biostatistics	3
PLSC 749	Applied Plant Molecular Breeding	3
PH 674	Epidemiology	3
PH 706	Essentials of Epidemiology	3
PH 731	Biostatistics	3
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PLSC 724	Field Design I	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models (required for Bioinformatics Ph.D. option)	3
STAT 711	Basic Computational Statistics using R	3
STAT 712	Applied Statistical Machine Learning	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
STAT 725	Applied Statistics	3
STAT 764	Multivariate Methods	3
STAT 840	Introduction to Statistical Design and Analysis of Gene Expression Experiments	3
STAT 851	Bayesian Statistical Inference	3
STAT 860	Statistical Machine Learning	3
Modeling and Sensing Electives		
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CSCI 628	Spatial Data Science	3
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
GEOG 670	Remote Sensing	3
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	3
PAG 654	Applications of Precision Agriculture	3

Doctoral Program

Code	Title	Credits
Functional Genomics		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
PLSC 721	Genomics Techniques (or)	2

or BIOC 674	Methods of Recombinant DNA Technology	
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
Requested Core Courses (unless in M.S. transcript)		
PLSC 631	Intermediate Genetics	3
STAT 726	Applied Regression and Analysis of Variance	3
Graduate Evolution Course		
Electives - At least one course from each of the following elective areas: Physiology, Gene Expression, Genetics and Genomics		15
899 Doctoral Dissertation		up to 90

Code	Title	Credits
Bioinformatics Option		
PLSC 611	Genomics	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 859	Computational Methods in Bioinformatics	3
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
Required Core Courses (unless in M.S. transcript)		
CSCI 679	Introduction to Data Mining	3
CSCI 765	Introduction To Database Systems	3
STAT 661	Applied Regression Models	3
Electives - From the Computer Science, Statistics, Computational Biology elective areas		15
899 Doctoral Dissertation		up to 90

Code	Title	Credits
Phenomics Option		
CSCI 679	Introduction to Data Mining	3
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
Physiology Course		3
796 Current Topics (1 credit, 3 semesters)		3
790 Graduate Seminar (1 credit, 2 semesters)		2
STAT 726	Applied Regression and Analysis of Variance	3
CSCI 765	Introduction To Database Systems	3
Electives - At least one course from the Modeling and Sensing and Computer Science, Statistics, and Computational Biology elective areas		15
899 Doctoral Dissertation		up to 90

Code	Title	Credits
Physiology Electives		
ANSC 663	Physiology of Reproduction	3
BIOL 662	Physiological Ecology	3
BIOL 664	Endocrinology	3
BIOL 683	Cellular Mechanisms of Disease	3
BIOL 825	Biology of Aging	3
MICR 650	Infectious Disease Pathogenesis	3
MICR 680	Microbial Physiology	3
MICR 785	Pathobiology	3
PPTH 751	Physiology Of Plant Disease	3
PLSC 686	Applied Crop Physiology	3

PLSC 750	Crop Stress Physiology	3
PSCI 747	Cardiovascular Pharmacology	3
PSCI 762	Advanced Biopharmaceutics	2
PSCI 765	Cancer Cell Biology	2
Gene Expression Electives		
BIOC 660	Foundations of Biochemistry and Molecular Biology I	3
BIOC 683	Cellular Signal Transduction Processes and Metabolic Regulation	3
BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BIOC 723	Structural Basis of Membrane Transport and Signaling	3
BIOL 682	Developmental Biology	3
BIOL 820	Advanced Cell Biology	
MICR 775	Molecular Virology	3
PLSC 731	Plant Molecular Genetics	3
Genetics and Genomics Electives		
ANSC 657	Genetic Improvement of Livestock	3
ANSC 750	Quantitative Genetics Applications of Matrix Algebra	1
ANSC 751	A Primer to Quantitative Genetics	1
ANSC 752	Selection Index Theory and Application	1
BIOL 679	Biomedical Genetics and Genomics	3
BIOL 859	Evolution	3
BIOL 860	Evolutionary Ecology	3
BIOL 862	Environment and Adaptation	3
MICR 681	Microbial Genomics with Computational Laboratory	3
MICR 682	Microbial Genetics	3
PPTH 755	Population Biology of Plant Pathogens	3
PPTH 759	Host-Parasite Genetics	3
PLSC 631	Intermediate Genetics	3
PLSC 741	Cytogenetics	3
PLSC 751	Advanced Plant Genetics	3
PLSC 782	Population and Quantitative Genetics	
PSCI 617	Pharmacogenomics	2
Computer Science, Statistics, and Computational Biology Electives		
ANSC 850	Linear Models in Animal Breeding	1
ANSC 851	Genetic Prediction	1
ANSC 852	Applied Variance Component Estimation	1
ANSC 856	Prediction and Control of Inbreeding in Breeding Programs	1
BIOL 842	Quantitative Biology	3
BIOL 877	Analysis of Population and Demographic Data	3
CSCI 679	Introduction to Data Mining	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 736	Advanced Intelligent Systems	3
CSCI 765	Introduction To Database Systems	3
CSCI 879	Advanced Data Mining	3
MATH 630	Graph Theory	3
MATH 636	Combinatorics	3
MATH 830	Graph Theory	3
MATH 839	Topics in Combinatorics and Discrete Mathematics	3
MATH 864	Calculus Of Variations	3
MATH 867	Topics in Applied Mathematics	3
MICR 724	Applied Epidemiology and Biostatistics	3
PLSC 749	Applied Plant Molecular Breeding	3
PH 674	Epidemiology	3

PH 706	Essentials of Epidemiology	3
PH 731	Biostatistics	3
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PLSC 724	Field Design I	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models	3
STAT 711	Basic Computational Statistics using R	3
STAT 712	Applied Statistical Machine Learning	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
STAT 725	Applied Statistics	3
STAT 726	Applied Regression and Analysis of Variance	3
STAT 764	Multivariate Methods	3
STAT 840	Introduction to Statistical Design and Analysis of Gene Expression Experiments	3
STAT 851	Bayesian Statistical Inference	3
STAT 860	Statistical Machine Learning	3
Modeling and Sensing Electives		
ABEN 747	Numerical Modeling of Environmental and Biological Systems	3
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CSCI 628	Computational Techniques for Environmental Sustainability	3
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
GEOG 665	Remote Sensing of the Environment	3
GEOG 670	Remote Sensing	3
GEOG 680	Geographic Information Systems Pattern Analysis and Modeling	3
PAG 654	Applications of Precision Agriculture	3

Examinations

1. **Qualifying Exam (Ph.D. only):** This exam consists of written and oral portions. The student will complete a written exam that emphasizes the application of materials presented in the core courses. The members of the genomics graduate program will submit these questions. The oral exam will be administered by the student's graduate committee and will focus on material beyond the core courses that are specific to the research of the student. Upon completion of the qualifying exam, the student will be accepted as a Ph.D. candidate.
2. **Final Exam:** The final exam will be an oral defense of the student's research results. The student's graduate committee will administer the exam.

Samat Amat, Ph.D.

University of Calgary, Canada, 2019
 Department: Microbiological Sciences
 Research Interests: Animal Microbiome

Nonoy Bandillo, Ph.D.

University of Nebraska-Lincoln, 2016
 Department: Plant Sciences
 Research Interests: Pulse Breeding, Genetics

Samiran Banerjee, Ph.D.

University of Saskatchewan, 2012
 Department: Microbiological Sciences
 Research Interests: Agriculture Microbiomes; Plant-Microbe Interactions

Michael J. Christoffers, Ph.D.

University of Missouri-Columbia, 1998
 Department: Plant Sciences
 Research Interest: Weed Molecular Genetics

Anne Denton, Ph.D.

University of Mainz, 1996
Department: Computer Science
Research Interest: Data Mining, Bioinformatics

Justin D. Faris, Ph.D.

Kansas State University, 1999
Department: Plant Sciences
Research Interest: Wheat Molecular Genetics

Jason Fiedler, Ph.D.

The Scripps Research Institute, 2012
Department: Plant Sciences
Research Interests: Bioinformatics, High-throughput Genotyping, Small Grains Genetics

Paulo Flores, Ph.D.

Federal University of Rio Grande do Sul, 2008
Department: Agricultural and Biosystems Engineering
Research Interests: Precision Agriculture, Applications of UASs/Drones in Agriculture, UASs/Drone Imagery Analysis, GIS Applications for Precision Agriculture

Timothy Friesen, Ph.D.

North Dakota State University, 2001
Department: Plant Pathology
Research Interest: Host-Pathogen Interactions of Cereals

Barney Geddes, Ph.D.

University of Manitoba, Canada, 2014
Department: Microbiological Sciences
Research Interests: Plant Microbe Interactions

Upinder Gill, Ph.D.

Washington State University, 2012
Department: Plant Pathology
Research Interests: Host-Microbe Interactions, Genetics and Genomics of Plant Disease Resistance

Rich Horsley, Ph.D.

North Dakota State University, 1988
Department: Plant Sciences
Research Interests: Barley Breeding, Genetics

David P. Horvath, Ph.D.

Michigan State University, 1993
Department: Plant Sciences
Research Interest: Perennial Weed Physiology

Rick Jansen, Ph.D.

University of Minnesota, 2009
Department: Public Health
Research Interest: Molecular and Genomic Epidemiology

Xuehui Li, Ph.D.

University of Georgia, 2009
Department: Plant Sciences
Research Interests: Statistical Genomics

Zhaohui Liu, Ph.D.

North Dakota State University, 2006
Department: Plant Pathology
Research Interest: Host-Parasite Interactions of Wheat

Phillip E. McClean, Ph.D.

Colorado State University, 1982
Department: Plant Sciences

Research Interest: Plant Molecular Genetics

Steven W. Meinhardt, Ph.D.

University of Illinois, Champaign-Urbana, 1984
 Department: Biochemistry and Molecular Biology
 Research Interest: Protein Structure/Function

Carrie Miranda, Ph.D.

University of Missouri, 2018
 Department: Plant Sciences
 Research Interests: Legume Molecular Genetics and Bioinformatics

Juan Osorno, Ph.D.

North Dakota State University, 2006
 Department: Plant Sciences
 Research Interests: Legume Genetics/Genomics and Synteny

Birgit Pruess, Ph.D.

Ruhr-Universität Bochum, 1991
 Department: Veterinary and Microbiological Sciences
 Research Interest: Microbial Physiology and Gene Regulation

Jack B. Rasmussen Ph.D.

Michigan State University, 1987
 Department: Plant Pathology
 Research Interest: Molecular Plant/Microbe Interactions

Katie Reindl, Ph.D.

North Dakota State University, 2006
 Department: Biological Sciences
 Research interest: Cancer cell biology

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009
 Department: Computer Science
 Research Interest: Bioinformatics Analysis of Biological Networks

Sarah Signor, Ph.D.

University of California-Davis, 2013
 Department: Biological Sciences
 Research Interests: Insect Evolutionary Genomics

Vasant A. Ubhaya, Ph.D.

University of California-Berkeley, 1971
 Department: Computer Science and Operations Research
 Research Interest: Algorithm Analysis, Operations Research

Changhui Yan, Ph.D.

Iowa State University, 2005
 Department: Computer Science
 Research interest: Computational Bioinformatics

Gerontology

Department Information

- **Program Coordinator:**
Susan Ray-Degges, Ph.D.
- **Department Phone:**
(701) 231-7218
- **Application Deadline:**
Based on first major requirements.
- **Credential Offered:**
Ph.D. Dual Major

- **English Proficiency Requirements:**
Based on first major requirements.

Program Description

The Doctor of Philosophy (dual-major) option in Gerontology at North Dakota State University provides unique opportunities to study and conduct research in this growing and exciting field. The Gerontology Ph.D. at North Dakota State University (NDSU) is a dual-major linking a discipline based Plan of Study with an interdisciplinary perspective on aging. Depending on your specific area of interest, students will combine academic coursework in a primary major (Developmental Science, Exercise Science and Nutrition, Occupational and Adult Education, Emergency Management, or Psychology) with a secondary dual-major in Gerontology. The mission of the Gerontology Ph.D. is to promote aging-related research and education at North Dakota State University that uses a discipline based perspective that serves to enhance the length and quality of life.

Admission Requirements

Based on first major requirements.

In addition to meeting the requirements for the first major, the following Gerontology requirements must be completed.

Code	Title	Credits
ADHM 705	Environment and Aging	3
HDFS 723	Perspectives in Gerontology	3
HDFS 760	Aging Policy	3
HNES 652	Nutrition, Health and Aging	3
or HNES 726	Nutrition in Wellness	
EDUC 853	Instructional Methods for Adult Learners	3

Other Requirements:

- Dissertation on a Gerontology-related topic.
- Committee chair from the home department.
- At least two committee members from the approved Gerontology faculty list, one who must be from the home program area.

Health, Nutrition and Exercise Science

Department Information

- **Department Head:**
Yeong Rhee, Ph.D.
- **Graduate Coordinator:**
Kyle Hackney, Ph.D.
- **Department Location:**
Bentson Bunker Fieldhouse
- **Department Phone:**
(701) 231-7474
- **Department Web Site:**
www.ndsu.edu/hnes/ (<http://www.ndsu.edu/hnes/>)
- **Application Deadline:**
Exercise/Nutrition Science option: Applications completed by March 15 will be given priority for fall. Leadership in Physical Education and Sport option: rolling enrollment; enrollment is limited to 32 students. M.S. Dietetics (online), GPIDEA: March 1 for summer/fall and October 15 for spring.
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Master of Science (M.S) in Health, Nutrition, and Exercise Sciences (HNES) offers graduate study options in Exercise/Nutrition Science (https://www.ndsu.edu/hnes/graduate_programs/exercisenutrition_science/) (blended learning: online and in-person courses) and Leadership in Physical

Education and Sport (https://www.ndsu.edu/hnes/graduate_programs/leadership_in_physical_education_and_sport/) (online program at in-state tuition rates for out-of-state and international students). The different "options" represent the emphasis provided in the curriculum and culminating experience leading to the M.S degree. There is also an accelerated BS/MS in Dietetics and Nutrition path within the MS option in Exercise/Nutrition Science.

M.S- Health, Nutrition and Exercise Sciences

Option-Exercise/Nutrition Science (https://www.ndsu.edu/hnes/graduate_programs/exercisenutrition_science/)

The Exercise/Nutrition Science option prepares the graduate for advanced positions with an emphasis in the areas of physical activity, exercise science, nutrition, and health promotion. The department is devoted to researching and understanding the long-term effects of physical activity and nutrition, and translating this research into effective exercise science and wellness programs for children, adolescents, and adults of all ages. This option is appropriate for Nutrition, Dietetics, and Exercise Science graduates. There are three paths to complete the MS degree in this option (Plan A- Thesis, Plan B- Paper, Plan C- Internship/Capstone).

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Completion of a Bachelor's degree from an accredited university in field closely related to Nutrition, Dietetics, or Exercise Science.
3. A faculty has agreed to be the applicant's mentor.
4. The GRE is NOT required for this option.

Accelerated BS/MS in Dietetics and Nutrition

This is a combined program for undergraduate dietetics students. Students apply for the dietetics program in the spring of their second (sophomore) year and then apply for the accelerated M.S. program in the fall of their third (junior) year. Students in this option will earn a B.S. in Dietetics, an M.S. in Exercise/Nutrition Science, and complete the required 1200 hours of supervised practice to sit for the national Registration Exam for Dietitians. The program is designed to be completed in 5 years. Students who are interested should contact the College of Human Development and Education Academic Advisor located in EML 270 for more information.

Option- Leadership in Physical Education and Sport (https://www.ndsu.edu/hnes/graduate_programs/leadership_in_physical_education_and_sport/)

The Leadership in Physical Education and Sport (LPES) option is an online program that prepares teachers, coaches, and sport leaders to become actively engaged in leadership roles within school systems or professional organizations. This degree prepares students to be master teachers, head coaches, department heads, and activities directors at the interscholastic level; assistant coaches, lecturers, and assistant or lead directors at the intercollegiate level; and to become actively engaged in leadership roles within professional organizations.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Undergraduate degree in the field of Kinesiology (physical education, coaching, sports management, etc.)
3. The GRE is NOT required for this option.

A 3.0 is needed to be considered for full acceptance into the LPES program. Applicants with an undergraduate GPA below 3.0 will be considered for conditional acceptance and will have to complete 6 graduate credit hours with grades of at least B to be considered for full standing. Meeting these criteria does not guarantee acceptance.

Admission to a MS- HNES program is considered ONLY after all required application materials have been received and reviewed.

MS- option in Exercise/Nutrition Science (https://www.ndsu.edu/hnes/graduate_programs/exercisenutrition_science/)

Minimum criteria and application information to be considered for admission for all paths (Plan A- thesis, Plan B- paper, Plan C- Internship/Capstone): Note-meeting the minimum criteria does not guarantee acceptance in the program. Workload limitations and capacity limits for the program or faculty mentor apply.

- The GRE is **NOT** required for this degree option.
- GPA 3.0 or higher
- Undergraduate major of Dietetics, Exercise Science, or closely related field.
- Application to the NDSU Graduate School which includes: precise statement of purpose, official transcripts, and three professional letters of recommendation.

- In the application, please indicate what degree path (Plan A- Thesis, Plan B- Paper, Plan C- Internship/Capstone) you are primarily considering at this time. This path can change once admitted but provides the HNES department with preliminary information on your plan of study. A description of all the paths are described below.
- Please also note in your application if you are interested in a graduate assistantship position and indicate any previous experience with teaching, research, or other specific skills, abilities, or certifications you possess that would be relevant.

The Department of Health, Nutrition, and Exercise Sciences reserves the right to obtain additional information about the applicant's professional competence from qualified professionals. Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data.

MS- Option in Leadership in Physical Education and Sport (https://www.ndsu.edu/hnes/graduate_programs/leadership_in_physical_education_and_sport/)

Admission is competitive and limited to 32 students. Applications are accepted on a rolling basis and students may be admitted for fall, spring, and summer semesters. Admitted out-of-state and international students are charged in-state tuition rates for this online program.

Admission requirements are as follows:

1. Cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale.
2. Undergraduate degree in the field of Kinesiology (physical education, coaching, sports management, etc.)
3. The GRE is NOT required for this option.

A 3.0 is needed to be considered for full acceptance into the LPES program. Applicants with an undergraduate GPA below 3.0 will be considered for conditional acceptance and will have to complete 6 graduate credit hours with grades of at least B to be considered for full standing. Meeting these criteria does not guarantee acceptance.

Financial Assistance

Both research and teaching assistantships may be available. Applications are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School by the program deadline. The department admits students for fall semester only in the Ph.D. program and the MS Exercise/Nutrition option. Graduate assistants receive a financial stipend for their work, and a full tuition waiver for fall, spring, and summer semesters. Assistantships are available contingent upon current funding and faculty need.

Exercise/Nutrition Science Option

Plan A- thesis

The thesis typically includes a problem statement, a review of existing literature relevant to that problem, and the creation and presentation of new knowledge in providing a solution to the problem. Each student assembles a supervisory committee and pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful defense, the candidate will submit an electronic copy of their thesis to the Graduate School for review. This path is recommended for all students but specifically relevant for those interested in going on to further graduate work (PhD, DPT, MD). Total Credits 31.

Plan B- paper

The Plan B master's student will develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. Note that under this degree, the new knowledge being created is limited, and this is the primary difference between the Plan A and Plan B degrees. The precise nature of the individual creative component is defined by the program. Examples of possible creative components include a comprehensive paper or an integrated field experience. Each student would assemble a supervisory committee and pass a final oral examination. Following a successful defense, the candidate will compose an executive summary or assemble other appropriate documentation as defined by the program to be submitted to the Graduate School. This submission to the Graduate School is to be approved by the student's supervisory committee. This path is recommended for all students but is specifically relevant for those who wish to obtain employment directly after completing their degree or who may still be interested in further graduate work but the scope of the next step is not yet defined. Total credits 31.

Plan C-Internship/Capstone

The Plan C is designed for programs in which a well-defined culminating experience is more important than is an individual creative component. Each program will define a culminating experience such as a capstone experience or some other approach to measure the candidate's understanding of the relevant material in the area (certification, internship experience/project). The student's supervisory committee would generally consist of faculty solely from within that discipline. The supervisory committee may specify that a certain level of performance (i.e., a minimum GPA) be obtained in specified courses or in the program itself. Upon completion of the appropriate course work and culminating experience, the candidate must submit

the examination documentation (if required by program) and an Application for Graduate Degree to Graduate School. This path is recommended for all students but is specifically relevant for those who are currently employed full-time in the community and are wishing to advance their current employment status (i.e., no further graduate work). Total credits 34.

Code	Title	Credits
Plan A - Thesis Option		31
HNES 790	Graduate Seminar (Introduction to HNES)	1
HNES 713	Graduate Exercise Physiology	3
HNES 710	Introduction to Research Design and Methods in HNES	3
HNES 726	Nutrition in Wellness	3
HNES 727	Physical Activity Epidemiology	3
STAT 725	Applied Statistics	3
Electives (See below)		9
HNES 798	Master's Thesis	6
Plan B - Master's Paper Option		31
HNES 790	Graduate Seminar (Seminar Introduction to HNES)	1
HNES 710	Introduction to Research Design and Methods in HNES	3
HNES 713	Graduate Exercise Physiology	3
STAT 725	Applied Statistics	3
HNES 726	Nutrition in Wellness	3
HNES 727	Physical Activity Epidemiology	3
Electives (see below)		12
HNES 797	Master's Paper	3
Plan C - Internship/Capstone Option		34
HNES 790	Graduate Seminar (Seminar Introduction to HNES)	1
HNES 713	Graduate Exercise Physiology	3
HNES 726	Nutrition in Wellness	3
Electives (see below)		18 or more
Choose 6 credits from		
HNES 793	Individual Study	
HNES 794	Practicum/Internship	
HNES 795	Field Experience	
Electives		
HNES 660	Leadership and Communication in Dietetics	3
HNES 703	Graduate Biomechanics of Sport and Exercise	3
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 724	Nutrition Education	3
HNES 735	Nutrition and Human Performance	
HNES 754	Assessment in Nutrition and Exercise Science	3
HNES 760	Skeletal Muscle Physiology	3
HNES 761	Physiological and Fitness Assessment in Exercise Science	3
HNES 762	Exercise Endocrinology	
HNES 770	Evidence Based Research and Practice	2
HNES 777	Scholarly Writing and Presenting in HNES	3
HNES 791	Temporary/Trial Topics	1-5
HNES 792	Graduate Teaching Experience	1-6

Leadership in Physical Education and Sport Option

The program requires a total of 30 credits. Students must complete the three required courses (offered every year) and may select the remaining courses from the elective list. Students present a final portfolio demonstrating their proficiency of program standards and competencies during the final semester of coursework.

Code	Title	Credits
Required		
HNES 700	Research in Physical Education and Sport	3
HNES 701	Leadership and Supervision	3
HNES 712	Principles of Management	3
Elective		
HNES 704	Psychological Foundation of Sport & Physical Activity	3
HNES 705	Analysis of Sport Skill Instruction and Acquisition	3
HNES 707	Sport in American Society	3
HNES 708	Positive Youth Development through Sport	3
HNES 709	Leadership Influence in Physical Education and Sport	3
HNES 711	Physical Education Curriculum	3
HNES 714	Legal Liability in HPER	3
HNES 715	Teaching Concepts -Based Fitness	3
HNES 716	Financial Management in Sport	3
HNES 731	Governance in Sport	3
HNES 736	Ethical Leadership	3
HNES 737	School-wide Physical Activity Promotion	3
HNES 738	Adapted Physical Education	3
HNES 739	Sport Revenue Generation	3
HNES 790	Graduate Seminar	1-3
HNES 792	Graduate Teaching Experience	1-6
HNES 793	Individual Study	1-3
HNES 795	Field Experience	1-3

Bryan Christensen, Ph.D.

University of Kansas, 2000

Research Interests: Biomechanics, Sports Psychology, Strength and Conditioning

Shannon David, Ph.D.

Ohio University, 2013

Research Interests: Patient-Clinician Relationship, Patient Oriented Outcomes

Joe Deutsch, Ph.D.

North Dakota State University, 2007

Research Interests: Physical Education Teacher Education, Youth Sport Coaching

Marty Douglas, Ph.D.

Michigan State University, 2009

Research Interests: Adapted Physical Activity

Julie Garden-Robinson, Ph.D.

North Dakota State University, 1994

Research Interests: Nutrition Education, Chronic Disease Prevention, Food Safety/Science

Kyle Hackney, Ph.D., CSCS, CCD.

Syracuse University, 2013

Research Interests: Skeletal Muscle, Sarcopenia, Muscle Inactivity, Ergogenic Aids, Sports Performance

Elizabeth Hilliard, Ph.D.

North Dakota State University, 2018

Research Interests: Breastfeeding Support and Promotion in the Workplace, and Infant and Child Feeding Practices

Jenny Linker, Ph.D.

University of Illinois Urbana-Champaign, 2011

Research Interests: Comprehensive School Physical Activity Programs, Physical Education Teacher Preparation

Ryan McGrath, Ph.D.

University of Idaho, 2015

Research Interests: Frailty and Health, Epidemiology of Aging, Physical Activity and Health for Aging Adults and Persons with Disabilities, Disability Prevention

Yeong Rhee, Ph.D.

Oklahoma State University, 1999

Research Interests: Chronic Disease Prevention, Functional Foods

Sherri Nordstrom Stastny, Ph.D.

North Dakota State University, 2007

Research Interests: Nutrition for Healthy Aging

Bradford N. Strand, Ph.D.

University of New Mexico, 1988

Research Interests: Physical Education Curriculum and Instruction, Fitness Education, Sport Sociology

Donna J. Terbizan, Ph.D.

The Ohio State University, 1982

Research Interests: Exercise Physiology, Fitness, Wellness, Exercise Science, Chronic Disease Change

History

Department Information

- **Department Head:**
Mark Harvey, Ph.D.
- **Graduate Program Director:**
Marcela Perett, Ph.D.
- **Department Location:**
422 Minard
- **Department Phone:**
(701) 231-8654
- **Department Email:**
ndsu.history@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/history/ (<http://www.ndsu.edu/history/>)
- **Application Deadline:**
April 1 for assistantship consideration
- **Credential Offered:**
Ph.D., M.A., M.S.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7

Program Description

The graduate program in history at North Dakota State University has offered a master's degree since the Graduate School was founded in 1954 and a Ph.D. in History since 2002.

For more information on our Master's and Doctoral programs, please see the department's website.

Master's Degree

The Department of History graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School admission requirements, the applicant must also

- provide a statement of intent that clearly outlines the applicant's interest and purpose for seeking a master's degree in history. The department uses this statement to assess the applicant's ability to organize thoughts, to formulate a plan of academic study, and to complete the graduate program. This statement also enables the department to determine whether North Dakota State University's graduate history program suits the applicant's needs and objectives.

- Submit a substantial paper submitted for an upper-division history class or for a class in the humanities and social sciences. The paper should provide evidence of an applicant’s ability to synthesize information, to organize his/her thoughts logically, and to communicate clearly and effectively.
- Take the general Graduate Record Examinations (GRE) and submit these scores before admission to the program. The department requires students whose native language is not English to submit a TOEFL score.

Ph.D.

Preference for admission into the Ph.D. program with full graduate standing will be given to applicants who have a GPA of at least 3.5 in history courses in an earned bachelor’s or master’s degree.

Applicants shall submit a statement of intent clearly outlining their research interests, potential major adviser, career goals, and purpose for seeking a Ph.D. in History.

Applicants will submit a substantial paper submitted for a class in History to provide evidence of ability to research thoroughly, to interpret and analyze primary and secondary sources, to synthesize information, to organize thoughts logically, and to communicate clearly and effectively.

The GRE examination is required.

The TOEFL is required for students for whom English is not a native language.

Residency Requirements

Students enrolled in the Ph.D. program are required to complete at least one academic year (18 credits minimum) in residence on campus.

Most graduate courses are held during the workday, but a number of courses are offered in the late afternoon and evening each semester to accommodate working professionals within driving distance of NDSU. Online courses are not typically offered.

Financial Assistance

Both teaching and research assistantships are available. Graduate assistants work between 10 and 20 hours per week, and the appointments include a tuition waiver. Students wishing to apply for assistantships should indicate this in their application. The deadline for assistantship applications is March 1.

The department awards and renews assistantships based on maintenance of good standing in the program and full-time registration during the appointment, demonstration of historical knowledge and good communication skills, progress towards completion of a degree, financial need, and minority status in cases of equally qualified candidates.

Master’s students can generally expect a maximum of 2 years of funding, while doctoral students are typically awarded no more than 4 years of support.

Master's Degree

Master of Arts

The department offers both the Master of Arts and the Master of Science degrees in history. The Master of Arts requires proficiency in at least one foreign language and the successful defense of a thesis. Those planning to continue graduate study in history at the doctoral level are strongly encouraged to pursue the MA. The Master of Science is designed for in-service professionals and has no language or thesis requirement; students pursuing the MS are generally not awarded assistantships or tuition waivers. Both degrees require a minimum of 30 credit hours with a minimum of 24 hours in history.

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research (taken during second year)	1
HIST 710	Research Seminar in North American History	3
Select 6 credits of the following (one to be declared the student’s major area and the other the minor area):		6
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	
History course work at 600 level or above		6-9
Course work in approved outside field, at 600 level or above		3

HIST 798	Master's Thesis	8
Total Credits		30-33

Master of Science Degree

Code	Title	Credits
HIST 702	Historiography	3
HIST 710	Research Seminar in North American History	3
Select 9 credits of the following (one to be declared the student's major area and the other the minor area):		9
HIST 730	Readings in North American History	3
HIST 760	Readings in European History	3
HIST 780	Readings in World History	3
6xx-level or above courses (Up to 3 credits may be taken from outside of the history department.)		12
HIST 797	Master's Paper	3
Total Credits		39

Ph.D. Degree

The department offers a Doctor of Philosophy Degree in History. The Ph.D. in History is a research degree. It requires the successful defense of a dissertation based on primary sources that makes an original contribution to knowledge. We only admit students who already hold an M.A. in History or another very closely related field.

Foreign language requirements vary from field to field. One foreign language is required for students in the U.S. field. At least two foreign languages are required for all others, depending on the languages needed to conduct research and access the secondary literature. The language requirement can be met by completing college coursework in that language through the second year (e.g., SPAN 202) or by passing a language exam administered by the faculty.

Code	Title	Credits
HIST 702	Historiography	3
HIST 705	Directed Research	1
HIST 710	Research Seminar in North American History (May be repeated for credit, provided the topics are different.)	3
Readings courses (Any of them may be repeated for credit, provided the topics are different.)		6
HIST 730	Readings in North American History	
HIST 760	Readings in European History	
HIST 780	Readings in World History	
6xx - level or higher courses (At least 3 and no more than 6 of these credits must come from non-HIST courses)		15
HIST 899	Doctoral Dissertation	1
Total Credits		29

Ashley Baggett, Ph. D.

Louisiana State University, 2014

Field: Women's History/Gender Studies, 19th century U.S., Southern History

Tracy Barrett, Ph.D.

Cornell University, 2007

Field: East and Southeast Asia, Overseas Chinese

Bradley Benton, Ph.D.

University of California, Los Angeles, 2012

Field: Latin American History, Colonial Mexico; Nahua (Aztec) politics, society, and culture; the early modern Atlantic world; cross-cultural contact and exchange.

John K. Cox, Ph.D.

Indiana University, 1995

Field: Eastern Europe, Russia, Germany, Ottoman Empire

Mark Harvey, Ph.D.

University of Wyoming, 1986
Field: American West, Environmental History, Public History

Thomas D. Isern, Ph.D.
Oklahoma State University, 1977
Field: History and Folklore of the North American Plains, History of Agriculture

Don Johnson, Ph.D.
Northwestern University, 2015
Field: Colonial and Revolutionary America History

Marcela Perett, Ph.D.
The Medieval Institute, University of Notre Dame, 2009
Field: Late Antiquity, Medieval Europe, Renaissance & Reformation

Angela Smith, Ph.D.
Middle Tennessee State University, 2011
Field: Public History, 20th Century American History, Cultural History, Digital History

Human Development and Family Science

Department Information

- **Department Head:**
Joel Hektner, Ph.D.
- **Department Location:**
Evelyn Morrow Lebedeff Hall
- **Department Phone:**
(701) 231-8268
- **Department Web Site:**
www.ndsu.edu/hdfs/academics/masters_degree/ (http://www.ndsu.edu/hdfs/academics/masters_degree/)
- **Application Deadline:**
One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
- **Credential Offered:**
M.S., Certificate
- **English Proficiency Requirements:**
TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

Programs of study leading to a Graduate Certificate or the Master of Science degree are offered in three options: Family Financial Planning, Youth Development, and Gerontology. All of these options are available via a collaborative, inter-institutional program offered through online distance education. Each program requires a capstone practicum or case study experience to complete the M.S. degree. Students can complete the M.S. programs in two to three years and the certificate programs in one calendar year.

The **Family Financial Planning (FFP)** M.S. option is a 36-credit program with a specific curriculum approved by the Certified Financial Planner (CFP) Board of Standards. Graduate certificates (18 credits) are available in Financial Planning and in Financial Counseling.

The **Gerontology** M.S. option requires 36 credits, and the Graduate Certificate requires 15 credits. An advanced degree in the field of Gerontology can benefit the professional in social work, nursing, counseling, recreation, public policy, long-term care administration, medicine, architecture, interior design, psychology, adult education, and rehabilitation therapy.

The **Youth Development** M.S. option requires 36 credits. Graduate Certificates (13 credits) are available in Youth Development and in Youth Program Management and Evaluation. Youth development is an emerging professional field. It has a positive orientation, meaning its focus is on promoting the positive development of youth, and it is an applied field, with professionals who put developmental research and theory into practice in structuring and implementing programs and services for adolescents.

In addition to the Graduate School's required application requirements, submit the statement of purpose indicating reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience you have acquired. In addition, be sure to address the following, in 500 words or less:

1. How your interest in this field developed.
2. Why you chose our program at NDSU.
3. The experiences you have had (e.g. informal, academic, employment, volunteer) that you see as related to this graduate program or your professional goals.
4. What your professional goals are and how this graduate program will help you accomplish your professional goals.

Family Financial Planning

Code	Title	Credits
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 770	Fundamentals of Financial Planning	3
HDFS 771	Investing for the Family's Future	3
Electives		9
HDFS 741	Theories & Research in Family Financial Planning II	
HDFS 767	Professional Practices in Family Financial Planning	
HDFS 768	Housing/Real Estate	
HDFS 772	Military Personal Financial Readiness	
HDFS 794	Practicum/Internship	
HDFS 797	Master's Paper	
HDFS 798	Master's Thesis	
Other elective approved by advisor		
Total Credits		36

Gerontology

Code	Title	Credits
ADHM 705	Environment and Aging	3
HNES 652	Nutrition, Health and Aging	3
HDFS 682	Family Dynamics of Aging	3
HDFS 721	Adult Development and Aging	3
HDFS 722	Methods and Theories in Gerontology	3
HDFS 723	Perspectives in Gerontology	3
HDFS 729	Professional Seminar in Gerontology	3
HDFS 760	Aging Policy	3
HDFS 794	Practicum/Internship	6
6 additional credits to be approved by the adviser and committee		6
Total Credits		36

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 711	Youth Development	3
HDFS 712	Positive Youth Development in Community Settings	3
HDFS 713	Adolescents and Their Families	3
HDFS 716	Youth Professionals as Consumers of Research	3
HDFS 717	Design and Evaluation of Youth Programs	3
HDFS 718	Youth Development Personnel and Program Management	3

HDFS 719	Youth Policy	3
HDFS 794	Practicum/Internship	6
Electives (select 2 courses)		6
HDFS 714	Contemporary Youth Issues (*)	
HDFS 715	Youth Culture	
HDFS 790	Graduate Seminar (*)	
Total Credits		36

*Upon approval of topic by adviser. Can be taken more than once with different topics.

Family Financial Planning

Select one of the options: Financial Planning or Financial Counseling

Code	Title	Credits
Financial Planning Option		
HDFS 762	Retirement Planning, Employee Benefits and the Family	3
HDFS 763	Personal Income Taxation	3
HDFS 765	Insurance Planning for Families	3
HDFS 766	Estate Planning for Families	3
HDFS 769	Financial Planning Case Studies	3
HDFS 771	Investing for the Family's Future	3
Total Credits		18

Code	Title	Credits
Financial Counseling Option		
HDFS 677	Financial Counseling	3
HDFS 740	Theories & Research in Family Financial Planning I	3
HDFS 768	Housing/Real Estate	3
HDFS 770	Fundamentals of Financial Planning	3
Select 6 credits of the following:		6
HDFS 741	Theories & Research in Family Financial Planning II	
HDFS 762	Retirement Planning, Employee Benefits and the Family	
HDFS 763	Personal Income Taxation	
HDFS 765	Insurance Planning for Families	
HDFS 766	Estate Planning for Families	
HDFS 771	Investing for the Family's Future	
HDFS 772	Military Personal Financial Readiness	
HDFS 794	Practicum/Internship	
Total Credits		18

Gerontology

Code	Title	Credits
Required Courses		
HDFS 721	Adult Development and Aging	3
HDFS 723	Perspectives in Gerontology	3
Elective Courses- Select 3		9
ADHM 705	Environment and Aging	
HNES 652	Nutrition, Health and Aging	
HDFS 682	Family Dynamics of Aging	
HDFS 760	Aging Policy	
HDFS 790	Graduate Seminar (*)	
Total Credits		15

Youth Development

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 711	Youth Development	3
Select 2 courses from the following:		6
HDFS 712	Positive Youth Development in Community Settings	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues ¹	
HDFS 715	Youth Culture	
HDFS 719	Youth Policy	
HDFS 790	Graduate Seminar ¹	
Total Credits		12

¹ With approval of topic by advisor.

Youth Program Management and Evaluation

Code	Title	Credits
HDFS 710	Foundations of Youth Development	3
HDFS 717	Design and Evaluation of Youth Programs	3
HDFS 718	Youth Development Personnel and Program Management	3
Select one course from the following:		3
HDFS 712	Positive Youth Development in Community Settings	
HDFS 714	Contemporary Youth Issues ¹	
HDFS 719	Youth Policy	
HDFS 790	Graduate Seminar ¹	
Total Credits		12

¹ With approval of topic by advisor.

James Deal, Ph.D.

University of Georgia, 1987

Research Interests: Identity Development in Emerging Adults, Particularly in the Areas of Religion and the Transition to College; First Generation and/or Low Income Students and Issues Related to Financial Support

Heather Fuller, Ph.D.

University of Michigan, 2009

Research Interests: Social Relationships and Well-Being Across the Lifespan (e.g. Intergenerational Relationships); Successful Aging and Health Promotion; Aging in Rural and Cross-Cultural Contexts; Aging Families and Caregiving; Survey Research and Program Evaluation

Joel Hektner, Ph.D.

University of Chicago, 1996

Research Interests: Design and Effectiveness of Programs to Prevent Adjustment Problems and Promote Well-Being in Children and Adolescents; Peer Affiliation Patterns and Peer Influences on Children's Behaviors; Family and School Conditions that Facilitate Optimal Experiences (Flow) and Optimal Development; the Experience Sampling Method

Carrie Johnson, Ph.D.

Iowa State University, 2012

Research Interests: Personal Finance for Low-Income and Underserved Populations; Financial Education Impact; Student Loan Debt: Program Delivery Methods and Evaluation; Behavioral Finance Across the Lifespan

Melissa O'Connor, Ph.D.

University of South Florida, 2010

Research Interests: Examining Age-Related Differences and Changes in Cognitive and Functional Abilities, Such as Driving, Among Healthy Adults and Clinical Populations; Quantitative Methods and Psychometrics; Interventions for Improving Cognition, Health, and Everyday Functioning; and Attitudes Toward Dementia

Rachelle Vetter, Ph.D.

North Dakota State University, 2006

Research Interests: Leadership and Volunteer Development

Industrial and Manufacturing Engineering

Department Information

- **Department Chair:**
David Grewell, Ph.D.
- **Email:**
david.grewell@ndsu.edu
- **Graduate Coordinator:**
Yiwen Xu, Ph.D.
- **Email:**
yiwen.xu@ndsu.edu
- **Department Location:**
202 Civil & Industrial Engineering Building
- **Department Phone:**
(701) 231-9818
- **Department Web Site:**
www.ndsu.edu/ime/ (<http://www.ndsu.edu/ime/>)
- **Application Deadline:**
International applications due March 1 for fall; August 15 for spring and summer. Domestic applications due one month prior to start of semester. For assistantship consideration, fall applications due March 1; limited spring openings.
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE - General
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Industrial and Manufacturing Engineering offers graduate studies at both the Master of Science and Doctor of Philosophy levels. A Master of Science degree may be earned in either Industrial Engineering and Management (IE&M) or Manufacturing Engineering (MfgE). The Master of Science degree can be completed through a thesis option. The IE&M master's programs are designed to equip students with the ability to analyze, design, and manage industrial and business systems as well as to enable students to develop scholarly abilities to further pursue a Ph.D. degree in industrial and manufacturing engineering. Students have an opportunity to conduct research in the development of theoretical concepts and industrial systems.

For more information about our department and programs, please visit our department website at www.ndsu.edu/ime/.

Admission Requirements

Graduate study in the Department of Industrial and Manufacturing Engineering is open to all qualified baccalaureate graduates from universities and colleges of recognized standing. In addition to the Graduate School requirements, applicants must submit a GRE score.

- M.S. - 310 (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 3.5 or better
- Ph.D. - 310 or better (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 3.5 or better

Financial Assistance

There are a limited number of teaching assistantships available in Industrial and Manufacturing Engineering, which are normally assigned as support for classes with large enrollments and/or heavy laboratory content. Research assistantships are offered when student's capabilities and background experience match the needs of the project. While teaching assistantships are funded through the University, research assistantships are generally funded through externally-funded grants and contracts. In both cases, assistantships are considered as employment, and the graduate student should view these appointments as a job. The student's thesis or dissertation may or may not be in the area of their job duties for the assistantship.

Full assistantships are for half-time employment (20 hours per week). Tuition for all graduate credits, resident or nonresident, are waived for individuals officially appointed as research or teaching assistants. Student fees are not waived. When a student is offered an appointment as a Graduate Research Assistant, the faculty and the department will carry the expectation that the student has made a full commitment to fulfill both the degree requirements and the job responsibilities.

Degree Requirements

The Master of Science degree in Industrial Engineering and Management or Manufacturing Engineering requires 30 credits of graduate-level study.

- A minimum of 15 credits from *didactic IME* courses (numbered IME 601-689 and IME 700-789) are required.
- In addition, a minimum of 6 credits of *other courses* are required for funded student (no matter GTA or GRA). This part of the course credits may come from approved graduate level courses of other departments. If a student is funded by himself/herself, then the minimum requirement of other courses is 8 credits.
- A minimum of 3 credits (i.e., from three semesters) from IME *graduate seminar* (IME 790) are required for a funded student (no matter GTA or GRA). If a student is funded by himself/herself, then the minimum requirement of the graduate seminar is 1 credit.
- 6 credits of thesis (IME 798) are required towards the M.S. degree.
- All graduate students are required to submit two articles to a refereed journal or refereed conference based on their thesis research.

The Doctor of Philosophy degree requires 60 credits beyond the M.S. requirement (90 credits total).

All students admitted into the IME Ph.D. Program must pass the qualifying exam (QE). The exam will include written and oral portions. *Four topics* will be selected by the major professor with consultation with the student. In general, the exam will measure the student's basic knowledge of the fundamentals in core topics related to IME. The written and oral exams will be executed with one day of each other, typically one week before the start of fall semester. Ph.D. students are recommended taking the QE at the end of their first year.

For students who are enrolled with a M.S. degree, the course credit requirements *beyond the M.S. degree* are:

- A minimum of 15 credits from *didactic IME courses* (IME 601-689 and 700-789), with at least 9 credits from 700-level IME courses. If courses are not offered in a timeline that meet the students requirements, it is possible for waiver/substitution requests.
- A minimum of 12 credits of *other courses* are required. This part of the course credits may come from approved graduate level courses of other departments.
- A minimum 3 credits of *Graduate Seminar* (IME 790).
- A minimum of 30 credits of *dissertation* (IME 899).

For students who are enrolled with a bachelor's degree, the course credit requirements are:

- A minimum of 30 credits from *didactic IME courses* (IME 601-689 and 700-789), with at least 9 credits from 700-level IME courses. If courses are not offered in a timeline that meet the students requirements, it is possible for waiver/substitution requests.
- A minimum of 27 credits of *other courses* are required. This part of the course credits may come from approved graduate level courses of other departments.
- Among these 57 course credits, at least 30 of them must be 700-level course. For example, if you take 9 credits of 700-level IME courses, then you need to take at least 21 credits of 700-level courses of other departments.
- A minimum 3 credits of Graduate Seminar (IME 790).
- A minimum of 30 credits of dissertation (IME 899).

For either the M.S. or Ph.D., all courses taken outside of the IME Department must be approved in advance by the student's academic adviser.

The total courses of study must be approved by the student's academic adviser, POS (plan of study) committee, and department chair. Students completing graduate degrees within the IME Department are expected to exhibit demonstrable expertise in the core competencies of either industrial engineering or manufacturing engineering. Students whose undergraduate major is in another field may be required to include some or all of the core competencies in their graduate coursework. For further information in this regard, please consult the IME department.

Each new student must have an academic advisor and select their POS committee by the end of their 1st semester of study (see IME grad handbook for requirements). This committee will be chaired by the faculty adviser and will provide direction, advice and examination of the student's work and achievement. All students must consult with their major advisor and submit a plan of study (POS) by the end of the second semester of study. Once approved, the POS will provide direction for the remainder of the student's degree work.

Faculty List

Canan Bilen-Green, Ph.D.

University of Wyoming, 1998

Research Interests: Statistical Process Control, Quality Management

Kambiz Farahmand, Ph.D., P.E.

University of Texas, 1992

Research Interests: Ergonomics Design, Layout Planning and Management

David Grewell, Ph.D.

Ohio State University, 2005

Research Interests: Bio-renewable Biodegradable polymers, High Power Ultrasonics, Micro-Fabrication and Polymer and Metal Welding

Trung (Tim) Q. Le, Ph.D.

Oklahoma State University, 2013

Research Interests: Data Analytics & Reliability Engineering, Medical Instrumentation

Lokesh Narayanan, Ph.D.

North Carolina State University, 2019

Research Interests: Biomedical Design, Bio-Manufacturing and Automation

Yiwen Xu, Ph.D.

University of Arizona, 2015

Research Interests: Integer Programming, Network Models and Machine Learning

Nita Yodo, Ph.D.

Wichita State University, 2017

Research Interests: Modeling and Optimization of Complex Systems, Predictive Analysis for Failures, Data Driven Decision Making Under Uncertainties

Om Prakash Yadav, Ph.D.

Wayne State University, 2002

Research Interests: Reliability Engineering, Robust Design

International Agribusiness

Department Information

- **Department Chair:**
William Nganje, Ph.D.
- **Graduate Coordinator:**
David C. Roberts, Ph.D.
- **Department Location:**
500 Barry Hall
- **Department Phone:**
(701) 231-7441
- **Department Web Site:**
www.ag.ndsu.edu/agecon/ (<http://www.ag.ndsu.edu/agecon/>)
- **Application Deadline:**
March 1 for fall semester, October 1 for spring semester
- **Credential Offered:**
M.S.
- **Test Requirement:**
GRE or GMAT
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The International Agribusiness M.S. program offered by the Department of Agribusiness and Applied Economics at North Dakota State University provides both the academic training and the international experience required to excel in an international agribusiness career. The program of study includes course work in applied economics, quantitative methods, and international agribusiness strategy, management, finance, and marketing.

Students are required to have an international experience that may be satisfied by meeting one of three options::

1. The student may participate in an international internship. Both paid and unpaid opportunities exist with international agribusiness companies, with government agencies, or with nonprofit organizations. The semester-long or summer internship can be arranged by the student or in cooperation with NDSU's Office of International Student and Study Abroad Services. Internship programs will be defined by the student and his or her major adviser, and approved by the Graduate Program Committee (GPC) and the student's supervisory committee.

- Students may participate in graduate courses in business or agribusiness at an international university during a semester-long or summer study abroad program. Study abroad programs will be defined by the student and his or her major adviser, and approved by the GPC and the student's supervisory committee.
- Students may select at least six additional credits of coursework offered at NDSU related to international business or agribusiness. Courses must be approved by the student's supervisory committee as part of the student's program of study prior to enrollment in the courses.

Students complete the program by writing and defending their comprehensive study papers under the supervision of their graduate committee.

In addition to the Graduate School admission requirements (<https://bulletin.ndsu.edu/graduate/admission-information/>), applicants must have earned a grade of B or higher in intermediate microeconomics and statistics including linear regression, and a grade of C or better in calculus.

Applicants must submit their complete application by March 1 for fall enrollment and October 1 for spring enrollment to guarantee admission and funding consideration. Admission will only be considered for candidates who submit a complete application.

It is desirable that students begin their program in the fall semester, although students may begin their program in the spring.

Financial Assistance

The Department offers assistantships on a competitive basis. Graduate Research Assistantships (GRAs) provide monthly stipends plus tuition waivers. Students must pay a minimal activity fee each semester. Assistantships do not begin until the first semester of full graduate standing when courses that apply for the Master of Science degree are taken.

Most assistantships are half-time (20 hours per week) or one-quarter-time (10 hours per week). Students on assistantship perform research or teaching duties in the Department in return for their stipend. Assistantships are typically limited to 16 months.

Granting assistantships depends on academic performance, departmental needs, and availability of assistantships.

Students pursuing a Master of Science in International Agribusiness must complete all core courses. Students select elective courses (with approval of their adviser and supervisory committee) to fulfill the remaining Graduate School credit requirements. The core requirements assure breadth and competence in key areas of knowledge and professional activity. Students participate in an international internship, a study abroad program, or select six additional credits of course work at NDSU related to international agribusiness. The following courses, or their equivalent, constitute the core of the Master of Science program:

Code	Title	Credits
Core Courses		
AGEC 701	Research Philosophy	1
AGEC 711	Applied Risk Analysis I	3
AGEC 712	Applied Risk Analysis II	3
AGEC 741	Advanced Microeconomics	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797	Master's Paper	1-10
or AGECE 798	Master's Thesis	
Select a minimum of 6 credits of the following:		6
ECON 610	Econometrics	
ECON 710	Advanced Econometrics	
AGEC 739	Analytical Methods for Applied Economics	
Or other approved quantitative coursework		
Approved Electives		1 - 9
Total Credits		30
		(minimum)

A minimum of 30 credits is necessary to complete the M.S. in International Agribusiness. Credits beyond those required courses listed above may be met through a combination of internship credits, courses taken during an international study program, or NDSU international courses approved by the student's supervisory committee.

David Bullock, Ph.D.

Iowa State University, 1989

Research Interests: Futures and Options Markets, Over-The-Counter Derivatives, Trading, Risk Management, Agrifinance, Monte Carlo Simulation, and Big Data Applications in Agriculture

James Caton, Ph.D.

George Mason University, 2016

Research Interests: Entrepreneurship Agent-based Computational Economics, Market Process Theory, Monetary Economics

Erik Hanson, Ph.D.

University of Minnesota, 2016

Research Interests: Agricultural Finance, Farm Management, Marketing and Production Economics

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Jeremy Jackson, Ph.D.

Washington University in St. Louis, 2008

Research Interests: Microeconomics, Political Economy, Public Finance

Thomas Krumel, Ph.D.

University of Connecticut, 2020

Research Interests: Rural Development, Labor Demand, and Labor Market Skills Mismatch

Kerianne Lawson, Ph.D.

West Virginia University, 2021

Research Interests: Economic Development, Economic Freedom, Law and Economics, Energy Economics

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Raymond March, Ph.D.

Texas Tech University, 2017

Research Interests: Public and Private Provision and Governance of Health Care in the United States

Dragan Miljkovic, Ph.D.

University of Illinois, 1996

Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

William Nganje, Ph.D.

University of Illinois at Urbana-Champaign, 1999

Research Interests: Agricultural Finance, Food Safety Economics

Bryon Parman, Ph.D.

Kansas State University, 2013

Research Interests: Whole Farm and Agribusiness Financial Structure, Risk Management, Land Values and Rents, and Farm Financial Trends

Frayne Olson, Ph.D.

University of Missouri, 2007

Research Interests: Crop Marketing Strategies, Crop Supply Chain Management, Agricultural Contracting, Agricultural Risk Management

Timothy Petry, M.S.

North Dakota State University, 1973

Research interests: Livestock Marketing

Xudong Rao, Ph.D.

University of Minnesota, 2015

Research Interests: Farm and Agribusiness Management, Risk Analysis, Efficiency and Productivity, Technology Adoption, Food and Agricultural Policy, International Agricultural Development

Veeshan Rayamajhee, Ph.D.

University of New Mexico, 2019

Research Interests: Individual and Collective Responses to Covariate Shocks

David Ripplinger, Ph.D.

North Dakota State University, 2011

Research Interests: Production Economics and Marketing

David Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Natural Resource and Environmental Economics, Econometrics, Production Agriculture

Anupa Sharma, Ph.D.

Virginia Polytechnic Institute and State University, 2016

Research Interests: Economics, Agriculture Business and Management

Cheryl J. Wachenheim, Ph.D.

Michigan State University, 1994

Research Interests: Agribusiness

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Materials and Nanotechnology

Department Information

- **Program Director:**
Erik K. Hobbie, Ph.D.
- **Email:**
Erik.Hobbie@ndsu.edu
- **Department Phone:**
(701) 231-6103
- **Department Web Site:**
www.ndsu.edu/materials_nanotechnology/ (http://www.ndsu.edu/materials_nanotechnology/)
- **Application Deadline:**
April 1 for fall semester.
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

North Dakota State University offers an interdisciplinary program leading to the Master of Science or Ph.D. degree in Materials and Nanotechnology (MNT). The program includes a series of required MNT core courses; additional elective courses; written and oral preliminary examinations; a doctoral dissertation based on independent, original research in the area of materials and nanotechnology; and a final oral examination of the dissertation.

The program in Nanotechnology and Nanomaterials is open to qualified graduates of universities and colleges of recognized standing. Students with a degree in the disciplines of chemistry, engineering, material science and engineering, physics, polymer science, polymer engineering, or related fields will be considered for admission. Applicants must meet the Graduate School requirements (p. 975).

Financial Assistance

Students are routinely supported through research assistantships. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. All students who submit complete applications by the appropriate deadlines are considered for assistantships. Exceptional students are also eligible for university fellowships that are awarded on a competitive basis.

By the end of the first academic year, the student will select an academic adviser from among the MNT faculty and arrange for the appointment of a Graduate Advisory Committee. This committee will consist of at least four members of the graduate faculty. This includes the student's major adviser, at least one additional MNT faculty member, and an appointee of the Graduate School.

The plan of study will be prepared by the student, in consultation with the major adviser, by the end of the first year in residence. The plan shall be approved by the student's Graduate Supervisory Committee, the MNT Program Director, and the Graduate School dean. The plan of study must be filed in the Graduate School prior to scheduling the comprehensive written examination.

Master of Science

Materials & Nanotechnology students are able pursue a master's degree under either the Plan A - Master's Thesis or the Plan C - Culminating Experience option. Each option requires a minimum of 30 graduate credits with a cumulative grade point average of 3.0 or better.

The Plan A thesis option represents a more traditional Master of Science degree, with an independent research component in the form of an original thesis that can serve as a foundation for future doctoral work in science or engineering. For the Thesis Option, of the required minimum 30 graduate credits, at least 16 credits must be from approved graduate courses numbered from 601-689, 691, 700-789, and 791 while the research credits (798) must be not fewer than 6 nor more than 10.

The Plan C option is appropriate for working professional students or students who are certain that they do not wish to pursue future graduate work in any field of science or engineering to the level of doctorate. In the context of the MNT program, this option requires a 6-10 credit culminating experience (794) which replaces the research credits (798).

Ph.D.

The Graduate School requires the plan of study for the Ph.D. degree to include not less than 90 semester graduate credits. Of this total, not less than 27 credits must be in courses other than seminar or research credits. Of the 27 course credits, 15 must be at the 700-789 level. The MNT Ph.D. program requires students to complete a series of 7 core courses totaling 17 semester credits. The student will complete additional elective courses to fulfill the Graduate School requirement of 27 semester credits in academic courses. An overall GPA of 3.0 or better must be maintained.

Core Curriculum

Code	Title	Credits
MNT 729	Materials Characterization	3
MNT 730	Nanotechnology and Nanomaterials	3
MNT 732	Physical Properties of Materials	3
MNT 745	Preparing Future Researchers	1
MNT 756	Molecular Modeling	3
MNT 760	Materials Synthesis Processing	3
MNT 790	Graduate Seminar	1

Students must complete at least an additional 12 credits of graduate level coursework. The courses should be chosen by the students in consultation and with the approval of the student's committee.

Suggested courses include the following:

Code	Title	Credits
Microelectronics Focus		
ABEN 682	Instrumentation & Measurements	3
CPM 796	Special Topics	2
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
ENGR 780	Electromagnetic Theory	3
ECE 751	Electromagnetic Theory and Applications	3
IME 627	Packaging for Electronics	3
IME 720	Surface Engineering	3
IME 635	Plastics and Injection Molding Manufacturing	3
MNT 735	Optoelectronics Materials and Processing	3
PHYS 771	Quantum Physics I	3
Biomaterials Focus		
ABEN 758	Applied Computer Imaging and Sensing for Biosystems	3
BIOC 716	Protein and Enzyme Biochemistry	3
BIOC 673	Methods of Biochemical Research	3
CE 725	Biomaterials-Materials in Biomedical Engineering	3
CPM 771	Modern Methods of Polymer Characterization	3
ME 668	Introduction to Biomechanics	3
ME 731	Mechanical Behavior of Materials	3
ME 743	Biomechanics Of Impact	3

ECE 685	Biomedical Engineering	3
ECE 687	Cardiovascular Engineering	3
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 701	Quantative Drug Design	2
Nanomaterials Focus		
CE 641	Finite Element Analysis	3
CE 793	Individual Study/Tutorial	3
CPM 673	Polymer Synthesis	3
CHEM 766	Quantum Chemistry I	4
CHEM 767	Quantum Chemistry II	2
CPM 686	Corrosion and Materials	3
CPM 773	Organic Chemistry Of Coatings	3
CPM 782	Physical Chemistry Of Coatings	3
CPM 796	Special Topics	3
IME 720	Surface Engineering	3
ME 682	Fuel Cell Science and Engineering	3
ME 712	Advanced Finite Element Analysis	3
ME 733	Polymer Nanocomposites	3
ME 734	Smart Materials and Structures	3
PHYS 758	Statistical Physics	3
PHYS 781	Solid State Physics	3
General Materials Science and Engineering Focus		
ABEN 658	Process Engineering for Food, Biofuels and Bioproducts	3
ABEN 644	Transport Processes	3
ME 673	Polymer Engineering	3
CE 641	Finite Element Analysis	3
CE 720	Continuum Mechanics	3
CHEM 732	Advanced Survey of Analytical Chemistry	4
CHEM 736	Mass Spectrometry	2
CPM 673	Polymer Synthesis	3
ME 633	Composite Materials Science and Engineering	3
ME 751	Advanced Thermodynamics	3
PHYS 611	Optics for Scientists & Engineers	3
PHYS 781	Solid State Physics	3

Affiliated Faculty

Iskander Akhatov, Ph.D.

Lomonosov University of Moscow, 1983

Research Interests: Fluid Dynamics, Multiphase Systems, Heat and Mass Transfer

Dilpreet Bajwa, Ph.D.

University of Illinois, 2000

Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials Utilization, Durability Engineering via Weathering and Degradation Mechanisms

Achintya N. Bezbaruah , Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Environmental sensors, Recalcitrant and micro pollutants, Contaminant fate and transport, Small community water and wastewater treatment, Environmental management

Gordon P. Bierwagen, Ph.D.

Iowa State University, 1968

Research Interests: Surface chemistry of coatings materials, corrosion, electrochemistry of coatings, coating lifetime prediction, concentrated random composites

Bret Chisholm, Ph.D.

University of Southern Mississippi, 1993

Research Interests: Combinatorial chemistry methods for coatings, novel organic-inorganic coatings applications, new polyester nanocomposites

Dr. Yongki Choi, PhD

City University of New York, 2010

Research Interests: Nanoparticle based electronics and sensors.

Andrew Croll, Ph.D.

McMaster University, Ontario, 2009

Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Stuart G. Croll, Ph.D.

University of Leeds, 1974

Postdoctoral: National Research Council, Canada

Research Interests: Weathering durability of coatings, physical chemistry and suspension stability, pigment/polymer interactions, film formation processes, coating and polymer physics

Alan R. Denton, Ph.D.

Cornell University, 1991

Postdoctoral, University of Guelph, 1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98

Research Interests: Soft Condensed Matter Theory, Computational Physics

Daniel L. Ewert, Ph.D.

University of North Dakota, 1989

Research Interests: Biomedical Engineering

Thomas Ihle, Ph.D.

Technical University, 1996

Research Interests: Theory and Simulation of Complex Fluids (Colloids, microemulsions and Biopolymers).

Long Jiang, Ph.D.

Nanyang Technological University, 2003

Research Interests: Polymer and Polymer Composite Processing, Polymer Processing Machinery and Design, Nanocomposites, Polymers and Composites Derived from Biomass, Functional Composites with Novel Microstructures.

Alan R. Kallmeyer, Ph.D.

University of Iowa, 1995

Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Dinesh Katti, Ph.D.

University of Arizona, 1991

Research Interests: Geotechnical Engineering, Constitutive Modeling of Geologic Materials, Expansive Soils, Multiscale Modeling, Steered Molecular Dynamics, Computational Mechanics, Nanocomposite, and Bionanocomposites. Computational Biophysics

Kalpana Katti, Ph.D.

University of Washington, 1996

Research Interests: Advanced Composites, Nanomaterials, Biomaterials, Biomimetics, Materials Characterization and Modeling, Analytical Electron Microscopy, and Microspectroscopy, Bone Tissue engineering

Svetlana Kilina, Ph.D.

University of Washington, Seattle, 2007

Research Interests: Photoexcitation process on the organic-inorganic interfaces in hybrid nanostructures: functionalized carbon nanotubes and quantum dots; Non-adiabatic dynamics in hybrid nanostructures: electron-phonon interactions in ligated quantum dots and functionalized carbon nanotubes; Self-assembly of bio-nanomaterials: structural aspects; Transport properties in amorphous conjugated polymers: effect of structural disorder.

Ivan T. Lima Jr., Ph.D.

University of Maryland, 2003

Research Interests: Photonics

Valery R. Marinov, Ph.D.

Technical University of Sofia, 1992

Research Interests: Process Modeling for Machining, Theory of Metal Cutting, Tribological Coatings, Including Nanocomposite Coatings and Deposition Methods, Design for Composites Manufacturing Processes, Packaging for low-cost disposable microelectronics, Direct-write material deposition methods, Laser processing

Sylvio May, Ph.D.

Jena, 1996

Research Interests: Physics of Lipid Membranes, Biophysics

Seth C. Rasmussen, Ph.D.

Clemson University, 1994

Postdoctoral, University of Oregon, 1995–99

Research Area: Inorganic/Organic Materials Chemistry, Chemical History

Jing Shi, Ph.D.,

Purdue University, 2004

Research Interests: Microelectronics

Packaging, Direct Write Material Depositing, Laser Processing for Electronics, RFID Applications, Numerical Modeling of Manufacturing Processes, Computer Integrated Manufacturing

Wenfang Sung, Ph.D.

Chinese Academy of Sciences, 1995;

Postdoctoral, University of Alabama, Birmingham, 1997-1999

Research Area: Organic Materials Chemistry

Chad A. Ulven, Ph.D.

University of Alabama at Birmingham, 2005

Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of Advanced Materials

Alexander J. Wagner, Ph.D.

University of Oxford, 1997

Postdoctoral MIT, 1998-2000, Edinburgh, 2000-2002

Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Xinnan Wang, Ph.D.

University of South Carolina, 2008

Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Dean Webster, Ph.D.

Virginia Polytechnic Institute and State University 1984

Research Interests: Synthesis of high performance polymers, polymerization reactions, crosslinking chemistry, and quantitative structure-property relationship

Xiangfa Wu, Ph.D.

University of Nebraska-Lincoln, 2003

Beijing Institute of Technology, 1998

Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Mathematics

Department Information

- **Department Chair:**
Friedrich Littmann, Ph.D.
- **Graduate Coordinator:**
Indranil Sengupta, Ph.D.
- **Department Location:**
412 Minard Hall
- **Department Phone:**
(701) 231-8171
- **Department Web Site:**
www.ndsu.edu/math (<http://www.ndsu.edu/math/>)

- **Application Deadline:**
March 1 to be considered for assistantships for fall. Openings may be very limited for spring.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71; IELTS 6

Program Description

The Department of Mathematics offers graduate study leading to the degrees of Master of Science (M.S.) and Doctor of Philosophy (Ph.D.). Advanced work may be specialized among the following areas:

- algebra, including algebraic number theory, commutative algebra, and homological algebra
- analysis, including analytic number theory, approximation theory, ergodic theory, harmonic analysis, and operator algebras
- applied mathematics, mathematical finance, mathematical biology, differential equations, dynamical systems,
- combinatorics and graph theory
- geometry/topology, including differential geometry, geometric group theory, and symplectic topology

Beginning with their first year in residence, students are strongly urged to attend research seminars and discuss research opportunities with faculty members. By the end of their second semester, students select an advisory committee and develop a plan of study specifying how all degree requirements are to be met. One philosophical tenet of the Department of Mathematics graduate program is that each mathematics graduate student will be well grounded in at least two foundational areas of mathematics. To this end, each student's background will be assessed, and the student will be directed to the appropriate level of study.

The Department of Mathematics graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 975), applicants must have earned a cumulative grade point average (GPA) of at least 3.0 or equivalent in all advanced mathematics courses at the baccalaureate level.

Financial Assistance

Teaching assistantships and a small number of research assistantships are available. Graduate tuition is waived for research and teaching assistants.

All students in full standing and, in certain situations, students in conditional status are eligible for assistantships. International students must show proficiency in reading, writing, and speaking English. In particular, they must pass an oral proficiency interview, which is a Test of Spoken English (TSE) prior to receiving a teaching assistantship. This interview is the culmination of the five-week Intensive English Language Program (IELP) available each summer. An indication, but not a guarantee, of being able to pass this interview is a TOEFL score of at least 600 (paper test) or 247 (computer test). All international students applying from outside the United States for a teaching assistantship must expect to take the IELP.

Assistantship applications will be considered at any time. However, opportunities are improved for those received by March 1 preceding the fall semester of intended enrollment.

At least one year of academic work must be spent in residence at NDSU in fulfilling graduate requirements for each graduate degree earned. The M.S. customarily takes two years to complete; the Ph.D. usually last three years beyond the master's. Students must maintain a cumulative GPA of at least 3.0 throughout their graduate career.

Master of Science

The Master of Science degree is offered in two options: the Thesis Option or the Comprehensive Study Option. The Thesis Option emphasizes research and preparation of a scholarly thesis, whereas the Comprehensive Study Option emphasizes a broader understanding of a major area of mathematics.

Departmental Requirements

1. At least 30 credit hours in approved graduate-level mathematics course work, depending on the degree option.
 - a. Thesis Option: At least 6 credit hours of MATH 798 Master's Thesis, in addition to at least 18 credit hours in courses numbered 700-789. These 18 credit hours must include six foundational courses.
 - b. Comprehensive Study Option: At least 2 credit hours of MATH 797 Master's Paper, in addition to at least 24 credit hours in courses numbered 700-789. These 24 credit hours must include six foundational courses. Subject to the approval of the Supervisory Committee, at most 6 of the required 30 credits may be earned in 600-level mathematics courses (excluding 620, 621, 650, and 651) or in courses outside the Mathematics Department.
2. A grade of Master's Pass in four of the written preliminary examinations offered by the department. These examinations are offered in the areas: Algebra, Analysis, Combinatorics, Applied Mathematics, and Geometry/Topology.

3. A thesis or expository paper written under the supervision of a faculty member and defended at an oral examination administered by the student's supervisory committee.

Timelines

A candidate has three calendar years from the time of enrollment in the Graduate School to complete the Master's degree. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Doctor of Philosophy

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering a significant, original aspect of mathematics.

Departmental Requirements

1. A total of at least 90 credit hours in approved graduate-level mathematics course work, including:
 - a. At least 42 credit hours in courses numbered 700-789 or as approved by the Graduate Program Director. These 42 credit hours must include six foundational courses. The advisor should in consultation with the graduate chair ensure that the 42 credit hours contain a broad spectrum of courses (at least 12 credit hours) outside the student's area of emphasis as well as depth in a specific area of mathematics.
 - b. At least 3 credit hours of MATH 790 Graduate Seminar.
 - c. At least 6 credit hours of MATH 799 Doctoral Dissertation. Subject to the approval of the supervisory committee, at most 12 of the required 42 credit hours may be earned in 600-level mathematics courses (excluding 620, 621, 650, and 651) or in courses outside the Mathematics Department. Credits used to satisfy the requirements of a Master's degree at NDSU may be included in the 90 credit hours required for the Ph.D. A student entering the Doctoral program with a Master's degree from another institution need only complete 60 credit hours to complete the Ph.D. degree. Half of these 60 credits must be in courses numbered 700-789 excluding those courses numbered 720, 721, 750, and 751.
2. A grade of Ph.D. Pass in four written preliminary examinations offered by the department. These examinations are offered in the areas: Algebra, Analysis, Combinatorics, Applied Mathematics, and Geometry/Topology.
3. A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
4. A dissertation consisting of a written presentation of original and significant research completed by the student under the supervision of a faculty member and defended at an oral examination administered by the candidate's supervisory committee.
5. A dissertation video describing the candidate's research, evaluated by the candidate's supervisory committee.

Timelines

Ph.D. students have through the January Preliminary Exams during their third year in the program to demonstrate proficiency in basic areas of mathematics by passing the written Preliminary Examinations.

A student advances to candidacy after completion of the preliminary oral examination. All students must advance to candidacy by August 31st after their fourth academic year of study. Extensions may be granted after review and approval by the Graduate Committee, subject to Graduate School Policy.

Azer Akhmedov, Ph.D.

Yale University, 2004

Research Interests: Group Theory, Low Dimensional Topology

Maria Angeles Alfonseca, Ph.D.

Universidad Autonoma de Madrid, Spain, 2003

Research Interests: Fourier Analysis, Partial Differential Equations

Nikita Barabanov, Ph.D.

University of Kiev, 1979

Research Interests: Differential Equations, Control Theory, Optimization, Neural Networks

Jason Boynton, Ph.D.

Florida Atlantic University, 2006

Research Interests: Algebra

Catalin Ciuperca, Ph.D.

University of Kansas, 2001

Research Interests: Commutative Algebras, Algebraic Geometry

Dogan Comez, Ph.D.

University of Toronto, 1983

Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Josef Dorfmeister, Ph.D.

University of Minnesota, 2009

Research Interests: Symplectic Topology

Benton Duncan, Ph.D.

University of Nebraska, 2004

Research Interests: Operator Algebras, Noncommutative Functional Analysis

Torin Greenwood, Ph.D.

University of Pennsylvania, 2015

Research Interests: Combinatorics

Friedrich Littmann, Ph.D.

University of Illinois, Urbana-Champaign, 2003

Research Interests: Approximation Theory, Analytic Number Theory

Artem Novozhilov, Ph.D.

Moscow State University of Communication Means, 2002

Research Interests: Mathematical Biology

Indranil SenGupta, Ph.D.

Texas A&M University, 2010

Research Interests: Mathematical Finance and Stochastic Processes

Jessica Striker, Ph.D.

University of Minnesota, 2008

Research Interests: Enumerative, Algebraic, Geometric and Bijective Combinatorics

Abraham Ungar, Ph.D.

Tel-Aviv University, 1973

Research Interests: Differential Equations, Integral Transforms, Wave Propagation, Special Relativity

Ivan Yegorov, Ph.D.

Lomonosov Moscow State University, 2014

Research Interests: Applied Mathematics

MBA-Agribusiness

Department Information

- **Program Director:**
Derek Lehmberg, Ph.D.
- **Program Adviser:**
Elizabeth Worth, MEd
- **Email:**
elizabeth.worth@ndsu.edu
- **Agribusiness Liaison:**
Jennifer Carney, MEd
- **Email:**
jennifer.carney@ndsu.edu
- **Department Location:**
Barry Hall
- **Department Phone:**
(701) 231-6038
- **Department Web Site:**
www.ndsu.edu/business/agmba/ (<http://www.ndsu.edu/business/agmba/>)
- **Application Deadline:**
Applications are reviewed on a rolling admission basis for the intended or next available term.
- **Credential Offered:**

M.B.A.

• **Test Requirement:**

GMAT or GRE**

• **English Proficiency Requirements:**

TOEFL iBT 79; IELTS 6.5

Program Description

The Master of Business Administration (MBA) in Agribusiness program at North Dakota State University is a non-thesis, professional program designed to meet the educational needs of current and future agribusiness leaders. The program carves a niche at the intersection of business and agriculture, drawing on the resources and expertise of both the College of Business and the Department of Agribusiness and Applied Economics. It accommodates full- and part-time students, including working professionals, and focuses on preparing managers of agribusiness firms to make decisions that consider factors unique to agribusiness. Examples may include:

- production volatility caused by weather, pests, and biology;
- logistics disruptions;
- seasonality in production and consumption;
- long investment and production cycles;
- and linkages with the government, financial institutions, and other organizations.

In addition to these industry-specific topics, the program also provides a solid background in business, emphasizing the practicalities of managing agribusiness organizations. Graduates of the program can expect to gain high quality general business management skills along with in-depth knowledge of agribusiness and agricultural industries.

Financial Assistance

The College of Business and the Department of Agribusiness and Applied Economics offer financial assistance through a limited number of graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis to be considered for either an assistantship or scholarship. Assistantships include a stipend and tuition waiver for NDSU's base graduate tuition in return for work within the college. The tuition waiver is limited to graduate course work. Awards are competitive and administered on a case-by-case basis.

GMAT/GRE**

Individuals seeking admission to the MBA in Agribusiness may request a waiver of the GMAT/GRE requirement if they meet one of the following requirements:

- The applicant holds a terminal degree (e.g., PhD, MD, JD).
- The applicant has a minimum of five (5) years of recent, post-bachelor's, full-time, professional work experience, including managerial responsibilities.

Appropriate documentation (i.e. official transcript, resume) is required to be uploaded to the application file. It does not, however, guarantee a waiver. Applicants are reviewed on a case-by-case basis, and waiver approval is determined at the discretion of the program's administration.

The program will consist of 26-27 credits of core courses, with two elective courses (4-6 credits) for a total of 30-33 total credits.

Core courses of the MBA in Agribusiness (26-27 credits):

Code	Title	Credits
Core Courses		
AGEC 711	Applied Risk Analysis I	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797S	(Comprehensive Project/Agribusiness Strategy (capstone; integrate learning from previous courses; write a paper/case))	2
AGEC 790	Graduate Seminar	2
MBA 701	Strategic Cost Management	2
MBA 702	Advanced Financial Management	2
MBA 703	Advanced Organizational Behavior	2
MBA 704	Supply Chain and Operations Management	2
MBA 705	Strategic Marketing Management	2
MBA 706	Managing Information Resources	2
MBA 707	Microeconomics for Managers	2

or AGECE 741	Advanced Microeconomics	
MBA 708	Advanced Strategic Management	2
Students must take at least two elective courses (4-6 credits). The approved elective courses are shown below:		
Finance/Risk		
AGECE 646	Agribusiness Finance	3
AGECE 712	Applied Risk Analysis II	3
FIN 640	International Finance	3
MBA 711	Advanced Investment Analysis	2
MBA 712	Advanced Portfolio Management	2
MBA 713	Financial Derivatives	2
MBA 714	Financial Analysis and Valuation	2
Logistics/Supply Chain Management		
TL 711	Logistics Systems	3
TL 721	International Logistics Management	3
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 731	Logistics Decision Analysis	3
TL 829	Supply Chain Risk Management	3
Marketing		
AGECE 644	Advanced Commodity Trading	3
MRKT 634	Sales Management	3
MBA 721	Creating and Marketing Innovations	2
MBA 722	Marketing Analytics and Customer Intelligence	2
MBA 723	Digital Marketing	2
MBA 724	Integrated Marketing Communications	2
Quantitative Methods		
AGECE 739	Analytical Methods for Applied Economics	3
ECON 610	Econometrics	3
ECON 710	Advanced Econometrics	3
MBA 751	Business Analytics Concepts	2
MBA 752	Business Analytics Strategy	2
MBA 753	Business Analytics Methods	2
Other Electives, including those listed above and:		
AGECE 652	Food Laws & Regulations	3
AGECE 674	Cooperatives	3
AGECE 720	Food Safety Costs and Benefits Analysis	3
AGECE 725	Food Policy	3
AGECE 793	Individual Study/Tutorial	1-5
ECON 640	Game Theory and Strategy	3
ECON 672	International Trade	3
MBA 731	Leading and Managing Teams	2
MBA 732	Managerial Leadership: Essential Competencies	2
MBA 733	Management Decision Making	2
MBA 734	Negotiations and Alternative Dispute Resolution	2

Or other 600- or 700-level courses in the College of Business, or a related area, taught by graduate faculty, and approved by the MBA Program Director and the NDSU Graduate School.

Somnath Banerjee, Ph.D.

University of Central Florida, 2015

Field: Marketing

Paul Brown, MBA, CPA

North Dakota State University, 1989

David W. Bullock, Ph.D.

Iowa State University, 1989

Field: Agricultural Economics

Linlin Chai, Ph.D.

Iowa State University, 2016

Field: Marketing

Jeffrey (Jun) Chen, Ph.D.

University of North Carolina at Charlotte, 2014

Field: Accounting & Information Systems

Rajani Ganesh-Pillai, Ph.D.

University of Central Florida, 2009

Field: Marketing

Robert Hearne, Ph.D.

University of Minnesota, 1995

Field: Agricultural and Applied Economics

Jeremy Jackson, Ph.D.

Washington University in St. Louis, 2008

Field: Economics

Joseph M. Jones, Ph.D.

University of Missouri-Columbia, 1991

Field: Marketing

Derek Lehmberg, Ph.D.

University of Western Ontario, 2010

Field: Strategic Management

Siew Lim, Ph.D.

University of Georgia, 2005

Field: Economics

Joshua Marineau, Ph.D.

University of Kentucky, Lexington, 2012

Field: Organizational Behavior

Frayne Olson, Ph.D.

University of Missouri, 2007

Agricultural Economics

Supavich Pengnate, Ph.D.

Oklahoma State University, 2013

Field: Management Information Systems

Tim O. Peterson, Ph.D.

Texas A&M University at College Station, 1988

Field: Management/Organizational Behavior

Xudong Rao, Ph.D.

University of Minnesota, 2015

Field: Applied Economics

Frederick Riggins, Ph.D.

Carnegie Mellon University, 1994

Field: Management Information Systems

Saleem Shaik, Ph.D.

University of Nebraska, Lincoln, 1998

Field: Agricultural Economics

Tom Wahl, Ph.D.

Iowa State University, 1989

Field: Agricultural Economics

William W. Wilson, Ph.D., *Distinguished Professor*

University of Manitoba, 1980

Field: Agricultural Economics

Lei Zhang, Ph.D.

University of Texas at Dallas, 2011

Field: Economics

Limin Zhang, Ph.D.

University of Arizona, 2005

Field: Management Information Systems

Emeritus

Bahman Bahrami, Ph.D.

University of Nebraska-Lincoln, 1983

Field: Managerial Economics, Management Information Systems, Labor Relations and Negotiation

C. Frederick Eisele, Ph.D.

University of Iowa, 1971

Field: Labor Management and Negotiation

Karen Froelich, Ph.D.

University of Minnesota, 1994

Field: Strategic Management

Terry W. Knoepfle, J.D., CPA

University of North Dakota, 1981

Field: Business Law and Tax Accounting

Mechanical Engineering

Department Information

- **Department Chair:**
Alan Kallmeyer, Ph.D.
- **Graduate Coordinator:**
Yechun Wang, Ph.D.
- **Department Location:**
111 Dolve Hall
- **Department Phone:**
(701) 231-8671
- **Department Email:**
ndsu.me.gradprogram@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/me/ (<http://www.ndsu.edu/me/>)
- **Application Deadline:**
February 15 for fall semester; September 15 for spring semester. Applications received after the deadline will still be considered, but preference is given to those submitted by the deadline.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 79 IELTS 6.5

Program Description

The Department of Mechanical Engineering offers graduate programs leading to the M.S. and Ph.D. degrees. Graduate work may be concentrated in a variety of areas including engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal systems, fluid mechanics, energy, controls and mechatronics, or engineering materials with an emphasis on plastics, composite materials and nanomaterials. Students with a B.S. degree in physics or mathematics may pursue a special graduate program of study and earn an M.S. degree in Mechanical Engineering.

Admission to the ME program is granted in a competitive process that is based upon consideration of the student's undergraduate GPA, test scores, and area of interest. Students who have graduated from an accredited institution in the United States with a baccalaureate degree in Mechanical Engineering or a closely related field must possess a GPA of 3.0 or greater for consideration of admission at full standing. International students must also provide both the TOEFL (or IELTS) and GRE general test scores before their applications will be considered. Minimum requirements for consideration of admission are 79 on the TOEFL iBT or 6.5 on the IELTS, and 300 on the GRE (combined quantitative and verbal) with a minimum quantitative score of 155.

Financial Assistance

Research and/or teaching assistantships may be available to qualified students. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. The availability of research and teaching assistantships is contingent upon current funding levels.

Mechanical Engineering - M.S.

The minimum total semester credits required for the M.S. degree in Mechanical Engineering is 30. The M.S. degree can be earned with either of two options: the thesis option or the comprehensive study option.

With the thesis option, a student must complete 21-24 credits of graduate courses in mechanical engineering and a master's thesis of 6 to 9 credits of ME 798 Master's Thesis. At the conclusion of the graduate program, the student will be examined orally on the thesis and course work.

With the comprehensive study option, a student must complete 27 credits of graduate courses in mechanical engineering and a master's paper of no more than 3 credits of ME 797 Master's Paper. At the conclusion of the graduate program, the student must pass a comprehensive oral examination on the master's paper and course work.

For more detailed information on the requirements for the M.S. degree, contact the department.

Mechanical Engineering - Ph.D.

The Ph.D. program requires the completion of 90 credit hours of graduate study beyond the baccalaureate degree (60 credits beyond the M.S. degree). In addition to the credit requirements for the M.S. degree, the Ph.D. degree requires a minimum of 24 course credits and a minimum of 24 credits of research-based dissertation. The remaining 12 credits may consist of any approved graduate level credits.

Code	Title	Credits
M.S. Degree		30
	Minimum of 24 course credits	24
	Minimum of 24 credits of research-based dissertation	24
	Any approved graduate level credits	12
Total Credits		90

After the majority of course work has been completed, each student is required to pass a series of written qualifying exams on core subjects. After passing the written exams, an oral preliminary exam will be administered focusing on the student's proposal for the dissertation research. At the conclusion of the Ph.D. program, each student is required to pass a comprehensive oral final examination primarily focused on the dissertation. This exam may also cover material from course work, particularly courses fundamental to the dissertation. For more detailed information on the requirements for the Ph.D. degree, contact the department.

Fardad Azarmi, Ph.D.

University of Toronto, 2008

Research Interests: Thermal Spray Coatings, Thin Film, Multiscale Engineering Analysis, Finite Element Analysis, Failure in Materials, Corrosion, Materials Characterization, High Temperature Materials, Composite Structures, Metal Foams, Functionally Graded Materials

Jordi Esteveordal, Ph.D.

University of Houston, 1996

Research Interests: Advanced Laser Techniques, Thermo-Fluid and Spray Diagnostics, 3D particle Image Velocimetry, Phosphorescence, Infrared Thermography, Filtered Rayleigh Scattering, Bio-Fluid Measurements

Adam Gladen, Ph.D.

University of Minnesota, 2014

Research Interests: Renewable Energy, Solar Thermal Energy, Energy Storage - in particular Thermochemical Energy Storage, Thermodynamics, Solar Thermochemistry, Heat transfer, Radiative Transfer in Participating Media, Solar Reactor Design

Alan R. Kallmeyer, Ph.D.

University of Iowa, 1995

Research Interests: Theoretical, Computational, and Experimental Solid Mechanics, Fatigue and Fracture of Engineering Materials, Composite Materials

Ghodrat Karami, Ph.D.

Imperial College of Science and Technology, University of London, 1984

Research Interests: Multiscale Computational Solid Mechanics, Biomechanics, Cellular Mechanics, Micromechanics Characterization of Composites, Continuum Mechanics, Structural Mechanics, Nonlinear and Large Deformation and Analysis, Thermoelastic Analysis

Sumathy Krishnan, Ph.D.

Indian Institute of Technology, 1995

Research Interests: Solar Heating and Cooling, Concentrated Solar Power, Renewable Energy Integrated Systems

Robert V. Pieri, Ph.D.

Carnegie-Mellon University, 1987

Research Interests: Design, Materials and Nanomaterials Characterization, Instructional Pedagogy, Fracture Mechanics, Measurements, Alternative Energy, and Industrial Support

Majura Selekwa, Ph.D.

Florida A&M University, 2001

Research Interests: Robotics, Machine Intelligence, Soft computing Applications, Numerical Methods and Numerical Optimization, Optimal and Robust Control, Smart Actuation Control Systems, Real-Time Control in Mechatronics

Yildirim Bora Suzen, Ph.D.

Wichita State University, 1998

Research Interests: Computational Fluid Dynamics, Aerodynamics, Modeling of Industrial Transport Processes, Transition and Turbulence Modeling, Active/Adaptive Flow Control, Turbo machinery, Multiprocessor CFD

Annie X.W. Tangpong, Ph.D.

Carnegie Mellon University, 2006

Research Interests: Vibrations and Dynamics, Tribology, Friction Damping in Rotating Structures, Friction Damping in Nano- and Bio-materials

Chad A. Ulven, Ph.D.

University of Alabama at Birmingham, 2005

Research Interests: Advanced Composites Materials Development, Environmentally Friendly Materials Processing, Nondestructive Evaluation, Impact/High Strain Rate Characterization of Advanced Materials

Jessica L. Vold, Ph.D.

North Dakota State University, 2012

Research Interests: Additive Manufacturing Materials, Polymer Matrix Composites, Torrefaction of Lignocellulosic Materials, Bio-Based Composite Materials, Mechanical Testing, Material Characterization

Xinnan Wang, Ph.D.

University of South Carolina, 2008

Research Interests: Experimental Biomechanics, Synthesis of Nanomaterials, Nanomechanical Characterization, Nanomanipulation

Yechun Wang, Ph.D.

University of Maryland, 2007

Research Interests: Microfluidics, Biofluid Mechanics, Computational Fluid Dynamics, Numerical Analysis, and Characterization of Organic Coatings

Xiangfa Wu, Ph.D.

University of Nebraska-Lincoln, 2003

Beijing Institute of Technology, 1998

Research Interests: Nanofabrication and Nanomaterials, Advanced Composites, Fracture and Impact Mechanics

Yan Zhang, Ph.D.

Iowa State University, 2013

Research Interests: Experimental Fluid Dynamics, Advanced Flow Diagnostic Techniques, Wind Engineering and Wind Hazard Mitigation, Bio-Fluid Mechanics and Cardiovascular Hemodynamics Modeling

Merchandising

Department Information

- **Department Head:**
Kwangsoo Park, Ph.D.

- **Graduate Coordinator:**
Linda Manikowske, Ph.D.
- **Department Location:**
178 Evelyn Morrow Lebedeff Hall (EML)
- **Department Phone:**
(701) 231-7352
- **Department Web Site:**
www.ndsu.edu/adhm/ms_in_merchandising/ (http://www.ndsu.edu/adhm/ms_in_merchandising/)
- **Application Deadline:**
Applicants should apply at least two months prior to the start of classes each semester.
- **Credential Offered:**
M.S., Certificate
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Apparel, Merchandising, Interior Design and Hospitality Management offers graduate study leading to the Master of Science degree or a Graduate Certificate in Merchandising in collaboration with the Great Plains Interactive Distance Education Alliance (GP-IDEA). The Master's degree in Merchandising is an online program offered through Distance and Continuing Education at NDSU. Participating faculty members from the GP-IDEA have jointly developed the merchandising curriculum. Course are taught by faculty within the Alliance from Kansas State University, North Dakota State University, Oklahoma State University, South Dakota State University, and the University of Nebraska-Lincoln.

The master's degree in Merchandising is designed for professionals in a variety of merchandising fields to increase potential for advancing in their careers. Students in this program will learn in-demand skills such as data analysis, problem solving, and critical thinking to identify customer needs and develop effective business strategies. The fully online program allows students to complete course work while maintaining their professional careers.

The program builds the student's ability to complete the following essential merchandising-related job responsibilities:

- Analyze data using a variety of techniques
- Research and implement effective business strategies
- Design customer-focused product development strategies
- Create flexible promotional campaigns
- Balance the sustainable interests of businesses, consumers, and society
- Predict micro and mass-market cost controls
- Navigate trade regulations and recognize cultural concerns
- Understand the evolving standards of corporate social responsibility

Admission decisions are based upon the predicted success of the applicant as a student and professional in the chosen field and are made only after considering all available data. A student must meet all requirements for full admission. The following criteria act as guidelines for full acceptance: a cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale, and a GPA of at least 3.25 during the final 30 semester credits of graded undergraduate course work, or a minimum GPA of 3.0 on 10 semester credits of graduate course work.

Recommended Skills and Academic Preparation

Adequate technical skills and access is essential to be successful in an online program. Unlimited web access at high speeds is helpful. Word processing programs that are up-to-date are important, as is knowledge of writing and publishing programs. Familiarity with diverse learning management systems is also helpful. NDSU currently uses Blackboard; other institutions have similar but different programs. An ability to self-motivate and learn independently is necessary for programs where face-to-face interactions are not available.

Financial Assistance

Graduate assistantships are not available since this program is online and facilitated through the Great Plains Interactive Distance Education Alliance and Distance and Continuing Education at NDSU. Students who are full-time (enrolled for six credits or more) may apply for financial aid.

Master of Science

The 36-credit master's degree program consists of ten required 3-credit courses, listed below, as well options for the remaining 6 credits. **Course descriptions and tentative schedules are available at** <https://www.gpidea.org/program/merchandising> (<https://www.gpidea.org/program/merchandising/>) .

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Development and Evaluation	3
ADHM 740	Promotional Strategies in Merchandising	3
ADHM 750	Retail Theory and Current Practice	3
ADHM 765	Merchandising Analytics	3
ADHM 770	International Retail Expansion	3
ADHM 775	Research Methods in Merchandising	3
ADHM 780	Financial Merchandising Implications	3
ADHM 785	Strategic Merchandise Planning	3
ADHM 797S	Comprehensive Project (or ADHM 798 or Electives)	6
Total Credits		36

Graduate Certificate

The 12 credit graduate certificate program consists of three required 3-credit courses and one elective 3-credit course, listed below.

Code	Title	Credits
ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730	Product Design, Development and Evaluation	3
or ADHM 740	Promotional Strategies in Merchandising	
ADHM 750	Retail Theory and Current Practice	3
Total Credits		12

Microbiology

Department Information

- **Department Head:**
John McEvoy, Ph.D.
- **Graduate Coordinator:**
Danielle Condry, Ph.D.
- **Department Location:**
Van Es Hall
- **Department Phone:**
(701) 231-7512
- **Department Web Site:**
www.ndsu.edu/microbiology/ (<http://www.ndsu.edu/microbiology/>)
- **Application Deadline:**
December 15 for fall
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Microbiological Sciences offers graduate study leading to M.S. and Ph.D. degrees in Microbiology. Faculty in the department have expertise in microbiomes, microbial genomics, biotechnology, synthetic biology, molecular biology, virology, immunology, microbial physiology, and discipline-based education research. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Microbiology is an outcomes-based program focused on developing research project leaders.

M.S. in Microbiology

The master's program in Microbiology emphasizes research methodology and laboratory techniques. Student research and academic programs support a strong foundation of knowledge in microbiology and are individually tailored to meet the needs and interests of each student. Graduates are prepared for positions in research or commercial laboratories or for further graduate study. Students select a major adviser by the end of the first semester in residence. By the end of the first year in residence, the student and major adviser will select a supervisory committee. Students can earn an M.S. in Microbiology by completing a research thesis under the advisement of a research faculty member or by completing a comprehensive research paper in the program.

Graduating master's students will be able to:

1. Adhere to ethical and professional standards in Microbiology, including managing individual projects, engaging with the public, and being ready for the workplace.
2. Display an essential foundation in knowledge in Microbiology and/or Immunology, including proficiency in a range of techniques.
3. Critically analyze and write high quality technical documents. Contribute significantly (co-authorship) to scientific journal articles.

Ph.D. in Microbiology

The Ph.D. program in Microbiology encompasses many sub-disciplines, including plant-microbe and animal-microbe interactions, microbiome research, virology, vaccine development, soil microbiology, biofilm research, immunology, and discipline-based education research. The program trains students in the foundation of knowledge, process of inquiry, and philosophy of microbiology. It breaks with traditional programs by focusing training on seven well-defined learning outcomes that can be attained with or without supporting coursework. This includes outcomes for professional, ethical, and civic development. Doctoral graduates are prepared for a variety of career paths including academic or industry research and academic teaching.

Graduating doctoral students will be able to:

1. Demonstrate professional and ethical behavior consistent with the expectations of the discipline
2. Conduct scholarly inquiry relevant to societal challenges and the field of study
3. Utilize and apply discipline appropriate knowledge, concepts and theoretical frameworks
4. Demonstrate proficiency with a variety of classical and modern techniques
5. Communicate scientific research results to diverse audiences
6. Develop professional skills such as collaboration and personal effectiveness to be competitive in the job market
7. Demonstrate civic responsibility, citizenship and inclusiveness

The program of study is customizable to each student's training needs. In the absence of course requirements, the program holds students accountable for year-over-year progress toward the learning goals via annual assessments of student progress by the mentor and research advisory committee.

In addition to the Graduate School requirements (<https://bulletin.ndsu.edu/graduate/admission-information/>), applicants must have evidence of a strong academic record in the biological sciences. The following science courses are required or recommended:

Biology

- One year of general biology with laboratory (required)
- One course in genetics (required)
- At least one course in cellular biology, cellular physiology, animal physiology, or bacterial physiology (required)
- Microbiology and immunology (recommended)

Chemistry

- One year of general chemistry with laboratory (required)
- Two sequential terms of organic chemistry with a laboratory course (required)
- Biochemistry (required)

Physics

- Two sequential terms of physics with a laboratory (required)

Additional application requirements

The statement of purpose should include the following:

- An explanation of how obtaining a graduate degree in our program fits your career goals.
- A description of the qualities you possess that will contribute to your success in your chosen field.
- A description of any research experiences you have had. If you have had a research experience, it is important to include a letter of recommendation from your research adviser.
- A list of the areas of research in the department that interest you.

Financial Assistance

The student must first apply to the Graduate School and be accepted in full or conditional status before he/she is eligible for an assistantship. Research and teaching assistantships are contingent upon availability of funds and are awarded competitively. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need.

M.S. in Microbiology

The master's program requires 24 months of full-time study, completing a minimum of 30 semester credits with an overall GPA of 3.0 or better.

Students are required to select from a list of core courses for eight to nine didactic credits toward their degree.

Plan A (Thesis-based) MS: Of the 30 credits, 16 credits must be in didactic graduate courses. Plan A (Thesis-based) MS students can apply 6 to 10 credits towards MICR 798 research. This degree in microbiology requires a research-based thesis, a public seminar of the thesis research, and a final oral defense of the thesis. The supervisory committee administers the oral thesis examination.

Plan B (Paper-based) MS: Of the 30 credits, 21 credits must be in didactic graduate courses. Plan B (Paper-based) MS students can apply 2 to 4 credits towards MICR 797 paper-based research. This degree in microbiology requires the presentation of a thoroughly researched paper. The supervisory committee administers a oral examination at the culmination of the student's progress.

Students with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the required minimum 30 semester credits.

Examinations

Final Thesis Exam (Plan A, M.S. only): The final examination will be an oral defense of the student's research results. The students research advisory (thesis) committee will administer the exam after a public presentation of the work.

Paper-based Exam (Plan B, M.S. only): M.S. students in this option will produce an in-depth research paper on a specific topic in Microbiology. The paper will be reviewed by the student's graduate committee and approved when completed.

Ph.D. in Microbiology

The Ph.D. program is based on defined training outcomes. Degree requirements are in agreement with NDSU Graduate School requirements. The student and major adviser will prepare a plan of study by the end of the first year in residence. The Graduate School requires the plan of study for the Ph.D. degree to include no less than 90 semester graduate credits (60 credits for students matriculating with a master's degree). An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on requirements for this program.

Examinations

Qualifying Exam: Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first examines fundamental areas of knowledge that will be essential for success as a doctoral candidate. The second requires the student to write a research proposal targeted at a program administered by NIH, NSF, or NIFA and defend the proposal in an oral examination. After successful completion of the comprehensive written and oral preliminary examinations, the student will be formally admitted to candidacy for the Doctor of Philosophy degree.

Final Exam: The final examination will be an oral defense of the student's research results. The students research advisory committee will administer the exam after a public presentation of the work.

Samat Amat, Ph.D.

University of Calgary, 2019

Research Interests: Leveraging livestock microbiomes to improve nutrition and animal health, and reduce antimicrobial resistance.

Samiran Banerjee, Ph.D.

University of Saskatchewan, 2012

Research Interests: Soil and plant microbiome, agricultural intensification, climate change

Danielle Condry, Ph.D.

University of North Dakota, 2013

Research Interests: Discipline-based education research; designing authentic, inquiry curricula that includes elements of civic engagement; community engaged learning and its impacts on student success in the classroom

Glenn Dorsam, Ph.D.

Virginia Commonwealth University, 1998

Research Interests: Signaling by the gut hormone Vasoactive Intestinal Peptide and its role in gut microbiome development, abnormal inflammation, and fat deposition

Barney Geddes, Ph.D.

University of Manitoba, 2014

Research Interests: Using molecular genetics, functional genomics, and synthetic biology approaches to understand mechanisms of beneficial plant-microbe interactions

Penelope S. Gibbs, Ph.D.

University of Georgia, 2001

Research Interests: Avian *E. coli*, bacterial molecular pathogenesis, antimicrobial resistance, food safety

John M. McEvoy, Ph.D.

University of Ulster, 2002

Research Interests: *Cryptosporidium* ecology, evolution and host-parasite interactions; environmental microbiology

Birgit Pruess, Ph.D.

Ruhr-Universität Bochum, 1991

Research Interests: Global gene regulation in enteric bacteria; complex regulatory networks

Sheela Ramamoorthy, Ph.D.

Virginia Polytechnic Institute and State University, 2006

Research Interests: Virology and vaccinology

Jane M. Schuh, Ph.D.

North Dakota State University, 2000

Research Interests: Immunology; biomedical significance of the initiation and maintenance of allergic asthma; the innate immune response in health and disease; murine models of human asthma; *Aspergillus fumigatus*-induced immune response

Music

Department Information

- **Department Chair:**
E. John Miller, Ph.D.
- **Graduate Music Coordinator:**
Jo Ann Miller, D.M.A.
- **Department Location:**
115 Music Education Building
- **Department Phone:**
(701) 231-7932
- **Department Web Site:**
www.ndsu.edu/performingarts/music/ (<http://www.ndsu.edu/performingarts/music/>)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
D.M.A., M.M.
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5

Graduate Degrees

Graduate degrees (the Master of Music and the Doctor of Musical Arts) are offered in performance, conducting and music education.

Master of Music Degree (M.M.)

Three tracks are offered: Performance, Conducting and Music Education. The Performance, Choral Conducting and Instrumental Conducting tracks require a minimum of 30 credits; the Music Education track requires a minimum of 32 credits.

The M.M. in performance and conducting is the professional degree in music designed for performers and conductors wishing to augment and refine their skills. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Applications may be completed online at www.ndsu.edu/gradschool. (<http://www.ndsu.edu/gradschool/>) A complete application will include three recommendations, transcripts and a scholarly writing example. Applicants should notify the graduate music coordinator, jo.miller@ndsu.edu, (jo.miller@ndsu.edu) of their intention to apply. For applicants in performance and conducting, an on-campus visit and audition are required. Following acceptance into the masters program, applicants will complete a diagnostic exam, which will be used by their advisers to plan appropriate coursework.

All coursework must be passed with a minimum grade of B. Comprehensive written examinations in the student's primary area and in music academic studies must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive exam.

Conductors and performers will prepare a recital as their capstone experience. Those in the music education track will complete a written practicum. Both experiences will be planned with guidance by the candidate's committee. The committee will include three graduate faculty members: the adviser, a representative from music academic studies, and at least one other music faculty member.

Master of Music in Music Education Degree

This degree is designed to be completed in three summers or in a combination of summers and the academic year. Students must register for a least six credits per calendar year until all degree requirements are completed. Classes are offered both online and on campus. Course-work can be focused in elementary, choral/vocal, or instrumental music education. No thesis is required; rather, students will complete a four-credit practicum. The practicum will be agreed upon and planned jointly by the student and his/her adviser. Comprehensive written examinations must be passed near the end of or after coursework. The final oral examination (administered by the student's committee) occurs after the written comprehensive examination.

Doctor of Musical Arts (D.M.A.)

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities. Graduates will have attained the academic qualifications generally accepted for teaching at the college level.

Entering students in the vocal performance track are expected to have appropriate language proficiencies in French, German, and Italian. Remedial work may be required upon recommendation of the adviser and committee.

Recitals and a final written project are planned in conjunction with the candidate's committee, which consists of at least three graduate faculty members: the adviser, a representative from academic studies, and at least one other member at large.

All course work must be passed with a minimum grade of B. Qualifying examinations in the student's primary focus area and in academic studies must be passed near the end of or after course work, and prior to a final oral examination by members of the candidate's committee. All D.M.A. graduates must have reading proficiency in at least one foreign language. For some, an alternative such as a computer language or other research skill, if appropriate to the student's focus area, may be substituted. This proficiency will be determined and assessed by the candidate's committee. Further, students in Choral Conducting must demonstrate appropriate proficiency in foreign language diction.

Two tracks are offered: Performance and Conducting. Each track requires a minimum of 90 credits beyond the baccalaureate degree (93 for the D.M.A. in choral conducting). Students entering the program with an approved master's degree or its equivalent may apply credits toward the D.M.A. The graduate music faculty will determine the viability and number of transfer credits.

Additional information about graduate study at the Challey School of Music may be found at www.ndsu.edu/performingarts/music/graduate/.

Doctor of Musical Arts in Vocal Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52

History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy		6
MUSC 721	Advanced Vocal Pedagogy	
Literature		9
MUSC 767 & MUSC 768 & MUSC 769	Vocal Literature I-Baroque/Classical and Vocal Literature II-Romantic and Vocal Literature III-20Th Century/Contemporary	
Electives (In consultation with adviser)		9
Total Credits		90

Doctor of Musical Arts in Instrumental Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4,4)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		52
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature (Minimum six credits in each)		12-15
MUSC 722	Applied Instrumental Pedagogy	
MUSC 764	Applied Instrumental Literature	
Optional: Supplemental Literature		2-3
MUSC 641	Symphonic Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Electives (in consultation with adviser)		9
Total Credits		89-93

Doctoral of Musical Arts in Piano Performance

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (4,4,4,4,4,2,2)	
MUSC 748	Music Bibliography/Research Methods	

MUSC 780	Recital (3,3,3,3)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		50
History/Theory**		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		15
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Electives (in consultation with adviser)		11
Total Credits		90

* At least 3 credits of MUSC 790 must be earned while in residence at NDSU.

** At least one course must be taken from MUSC 611-734; at least one course must be taken from MUSC 740-744

Doctor of Musical Arts in Collaborative Piano

Code	Title	Credits
MUSC 731	Applied Study (4,4,4,4,2,2) <small>At least 4 semesters of MUSC 731 must be taken in residence during the DMA program</small>	
MUSC 748	Music Bibliography/Research Methods	
MUSC 750	Studies in Collaborative Piano (2,2,2,2)	
MUSC 780	Recital (3,3,3,3)	
MUSC 789	D.M.A. Thesis (1,1,1,1)	
Credits		46
History/Theory *		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature		6
MUSC 643	Keyboard Literature	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
MUSC 770	Topics in Keyboard Literature	
Vocal or Instrumental Specialization **		16-19
GERM 101	First-Year German I	
FREN 101	First-Year French I	
MUSC 642	Opera Literature	
MUSC 705	Graduate Diction Survey I	
MUSC 706	Graduate Diction Survey II	
MUSC 709	Graduate Ensemble	
MUSC 764	Applied Instrumental Literature	

MUSC 767	Vocal Literature I-Baroque/Classical	
MUSC 768	Vocal Literature II-Romantic	
MUSC 769	Vocal Literature III-20Th Century/Contemporary	
Electives (in consultation with adviser)		9
Total Credits		91-94

Doctor of Musical Arts in Conducting

Code	Title	Credits
MUSC 709	Graduate Ensemble (1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4)	
MUSC 733	Choral Studies and Pedagogy (Up to 4 credits (2,2) may be substituted for MUSC 731)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
MUSC 789	D.M.A. Thesis	
Credits		44
History/Theory		14
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6-12
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
or MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
MUSC 641	Symphonic Literature	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		14
Electives (in consultation with adviser)		12
Total Credits		90-96

Master of Music in Music Theory Pedagogy

Course List

Music Theory Core

Code	Title	Credits
Required Core Courses		16
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 735	Music Theory Pedagogy I	
MUSC 736	Music Theory Pedagogy II	
MUSC 794	Practicum	
Choose one of the following:		3
MUSC 611	Form and Analysis	
MUSC 734	Analytical Techniques	
Music Core		

74x History (Choose based on availability in course rotation)	3
MUSC 748 Music Bibliography/Research Methods	2
Electives (in consultation with adviser)	6
Total Credits	30

Overview of Program:

The primary purposes of the MM option in Music Theory Pedagogy are (1) to add to the breadth of the experiences for our graduate students and (2) to make them more attractive candidates in their job searches, especially those seeking teaching positions in higher education. The current job market in higher education prioritizes depth of knowledge and experience in more than a single specialty area. Often, this means extensive knowledge and experience in music history and/or music theory. Further, the most successful applicants on the academic job market have not only experience teaching music theory or music history, but also a relevant academic credential. This new program would allow enrolled students to advance their knowledge of music theory and their marketability in teaching the undergraduate theory sequence.

This degree track is designed for students who wish to expand their professional marketability by preparing performers/conductors for the many university positions that involve both performance and classroom teaching. The MM in Music Theory Pedagogy option will primarily be pursued by students jointly with another MM option or DMA in Performance or Conducting, though it has enough unique required courses to be granted as a single degree.

Master of Music in Music Education Degree

Code	Title	Credits
Music Education Core		9
MUSC 701	Psychology Of Music	
MUSC 703	Foundations of Music Education	
MUSC 790	Graduate Seminar	
Music Core		8
MUSC 702	Graduate Theory Survey	
MUSC 704	Graduate Music History Survey	
MUSC 731	Applied Study	
Music Electives		9
MUSC 713	Advanced Choral Music Methods	
MUSC 714	Advanced Elementary Music Methods	
MUSC 715	History of Choral Literature	
MUSC 758	Jazz Methods and Pedagogy in Music Education	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Capstone		
MUSC 794	Practicum	4
Total Credits		30

Master of Music in Instrumental Performance

Code	Title	Credits
Required Courses		20-23
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
MUSC 722	Applied Instrumental Pedagogy (2-3 credits)	
MUSC 764	Applied Instrumental Literature (1-3 credits)	
Optional: Choose from the following (in consultation with adviser)		0-3
MUSC 641	Symphonic Literature	
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Theory		3

MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Minimum Total Credits		30

Master of Music in Piano Performance

Code	Title	Credits
Required Courses		17
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Literature		2-3
MUSC 643	Keyboard Literature	
MUSC 770	Topics in Keyboard Literature	
Pedagogy²⁻³		
MUSC 623	Piano Pedagogy I	
MUSC 624	Piano Pedagogy II	
MUSC 723	Advanced Piano Pedagogy	
MUSC 724	Topics in Piano Pedagogy	
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Collaborative Piano

Code	Title	Credits
Required Courses		25
MUSC 705	Graduate Diction Survey I (3 credits)	
MUSC 731	Applied Study (10 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 750	Studies in Collaborative Piano (6 credits)	
MUSC 764	Applied Instrumental Literature (1 credit)	
MUSC 780	Recital	
One course to be taken from each of the following areas:		
Theory		3

MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Total Credits		31

Master of Music in Vocal Performance

Code	Title	Credits
Required Courses		19-20
MUSC 709	Graduate Ensemble (3 credits)	
MUSC 721	Advanced Vocal Pedagogy (2-3 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
One course to be taken from each of the following areas:		
Theory		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		
MUSC 767	Vocal Literature I-Baroque/Classical	
MUSC 768	Vocal Literature II-Romantic	
MUSC 769	Vocal Literature III-20Th Century/Contemporary	
Electives (in consultation with adviser)		1-2
Minimum Total Credits		30

Master of Music in Choral Conducting

Code	Title	Credits
Required Courses		18
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 721	Advanced Vocal Pedagogy (2 credits)	
MUSC 731	Applied Study (8 credits)	
MUSC 733	Choral Studies and Pedagogy (Up to 2 credits may be substituted for MUSC 731)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	

MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature (Two courses)		6
MUSC 760	Medieval/Renaissance Choral Literature	
MUSC 761	Baroque Choral Literature	
MUSC 762	Classical/Romantic Choral Literature	
MUSC 763	Contemporary Choral Literature	
Minimum Total Credits		30

Master of Music in Instrumental Conducting

Code	Title	Credits
Required Courses		18
MUSC 709	Graduate Ensemble (2 credits)	
MUSC 731	Applied Study (Conducting 8 credits)	
MUSC 731	Applied Study (Instrument 8 credits)	
MUSC 748	Music Bibliography/Research Methods (2 credits)	
MUSC 780	Recital (4 credits)	
Theory (One course)		3
MUSC 611	Form and Analysis	
MUSC 630	Counterpoint	
MUSC 631	Contemporary Harmonic Techniques	
MUSC 734	Analytical Techniques	
History (One course)		3
MUSC 740	Medieval/Renaissance Music History	
MUSC 741	Baroque and Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		6
MUSC 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Minimum Total Credits		30

Faculty

Jeremy Brekke, D.A., Associate Professor

Kelly W. Burns, D.M.A., Assistant Professor

Connor Challey, M.M., Lecturer

Andrew Froelich, D.M.A., Professor Emeritus

Robert W. Groves, Ph.D., Professor Emeritus

Sigurd Johnson, D.M.A., Associate Professor

Robert J. Jones, D.M.A., Professor Emeritus

Cassie Keogh, D.M.A., Associate Professor

Kyle Mack, D.A., Associate Professor

Jo Ann Miller, D.M.A., Professor

John Miller, Ph.D., Professor

Charlette Moe, D.M.A., Associate Professor

Warren Olfert, Ph.D., Professor

Matthew Patnode, D.M.A., Professor

Virginia Sublett, D.M.A., Professor Emerita

Karisa Templeton, Assistant Professor

Michael Weber, D.M.A., Professor

Tyler Wottrich, D.M.A., Associate Professor

Natural Resources Management

Department Information

- **Program Director:**
Shawn DeKeyser, Ph.D.
- **Email:**
Edward.Dekeyser@ndsu.edu
- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
(701) 231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/ (<http://www.ndsu.edu/snrs/>)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D., M.S., MNRM
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

Natural Resources Management (NRM) in the School of Natural Resource Sciences prepares students for the environmental challenges of the 21st century. The Master of Natural Resources Management (MNRM), Master of Science (M.S.) and the Doctor of Philosophy (Ph.D.) NRM degrees are interdisciplinary and offer a broad, systems-based approach toward managing natural resources. NRM graduates are prepared to compete for and be productive in jobs where issues reach beyond a single discipline or subject area. They have the skills necessary to address problems from a sustainable social-ecological perspective.

Through the NRM graduate program, students gain a breadth of knowledge in relevant planning, analysis and management.

In cooperation with the following NDSU academic programs and departments, students select a curriculum and an adviser from one of these participating units:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Biological Sciences (Botany and Zoology)
- Civil Engineering
- Communications
- Entomology
- Natural Resources Management
- Plant Sciences

- Range Sciences
- Earth and Climate Science
- Geosciences
- Soil Science
- Sociology/Anthropology/Emergency Management
- Veterinary and Microbiological Sciences

The educational objective of the NRM graduate program is to provide formal education in a chosen specialty area, introductions to other subject areas, appropriate course work in analytical methods, and research and writing experiences in the general area of natural resource management. Problem recognition, definition, analysis and resolution, along with critical thinking are the ultimate learning objectives.

Admissions Requirements

The graduate program in Natural Resources Management is open to qualified graduates of universities and colleges of recognized standing, and meet the Graduate School requirements.

Financial Assistance

Both research and teaching assistantships may be available through the participating academic units. Application for financial aid must be made directly to a department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. Limited scholarships are available.

To qualify for the MNRM degree, the candidate must satisfactorily complete a minimum of 30 semester credits of course work in his/her selected curriculum, and an oral presentation based on an NRM topic of the candidate's choice.

To qualify for the M.S. degree, the candidate must satisfactorily complete a minimum of 30 semester units in his/her selected curriculum, an oral examination, and a thesis or comprehensive study paper.

To qualify for the Ph.D. degree, the candidate must satisfactorily complete a course of study of no less than 90 semester credits (including 30 semester credits from the M.S. degree or equivalent), both a written and an oral preliminary examination, a research-based dissertation, and an oral defense of the dissertation. In addition, the candidate presents final public seminar based on the dissertation research. For more specific information, please refer to the School of Natural Resource Sciences website.

NRM program courses are offered by NRM and the other participating academic units. These include:

- Agribusiness and Applied Economics
- Agricultural and Biosystems Engineering
- Agricultural Systems Management
- Anthropology
- Biology
- Botany
- Civil Engineering
- Communication
- Computer Science
- Economics
- Entomology
- Geosciences
- Industrial and Manufacturing Engineering
- Mathematics
- Microbiological Sciences
- Philosophy
- Plant Pathology
- Plant Sciences
- Political Science
- Range Science
- Sociology
- Soil Science

- Statistics
- Zoology

Adnan Akyuz, Ph.D.

University of Missouri-Columbia, 1994

Research Area/Activity: Applied Climatology and Microclimatology/Climate Based Agricultural Management

Francis Casey, Ph.D.

Iowa State University, 2000

Research Area/Activity: Field Oriented Soil Physics, Measurement and Prediction of Water Transfer and Chemical Transport Through Soil

Amitava Chatterjee, Ph.D.

University of Wyoming, 2007

Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Larry J. Cihacek, Ph.D.

Iowa State University, 1979

Research Area/Activity: Erosion and Productivity Relationships, Conventional and Alternative Crop Management, Carbon Sequestration, Nutrient Management

Dennis Cooley, Ph.D.

University of Rochester, 1995

Research Area/Activity: Ethics (Bioethics, Environmental, Agricultural, Business, Professional, and Theoretical)

Edward (Shawn) DeKeyser, Ph.D.

North Dakota State University, 2000

Research Area/Activity: Wetland Ecology, Wetland Assessment and Monitoring, Invasive Species Ecology and Management, Native Prairie and Wetland Restoration

Tom DeSutter, Ph.D.

Kansas State University, 2004

Research Area/Activity: Trace Elements, Land Application of Byproducts, Inorganic Soil Chemistry, Soil Environmental Condition

Paulo Flores, Ph.D.

Federal University of Rio Grande do Sul, Brazil

Research Area/Activity: Precision Agriculture, Applications of UASs/Drones in Agriculture, UASs/Drone Imagery Analysis, GIS Applications for Precision Agriculture

Caley Gasch, Ph.D.

University of Wyoming, 2013

Research Area/Activity: Soil Ecology, Restoration, Reclamation, Monitoring of Degraded Soils

Benjamin Geaumont, Ph.D.

North Dakota State University, 2009

Research Area/Activity: Evaluation of Upland Bird Survival Habitat Use, Upland Game Species

Christina Hargiss, Ph.D.

North Dakota State University, 2009

Research Area/Activity: Wetland Assessment, Water Quality, Water Use, and Urban Ecosystems

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Area/Activity: Water Resources Management Institutions, Water Markets, Protected Area Management, Economic Valuation of Environmental Goods and Services

Torre Hovick, Ph.D.

Oklahoma State University, 2014

Research Area/Activity: Global change, Avian Ecology, Fire Ecology, Rangeland Management

Xinhua Jia, Ph.D.

University of Arizona, 2004

Research Area/Activity: Soil and Water Engineering, Hydrology

Chiwon W. Lee, Ph.D.

Purdue University, 1977

Research Area/Activity: Greenhouse Production, Vegetable Culture & Breeding

Wei Lin, Ph.D.

University of Buffalo, 1992

Research Area/Activity: Kinetic studies of physic-chemical and biological processes, Contaminant absorption during water and wastewater treatment, Impact of temperature on nitrification in wastewater treatment, River and lake water quality and non-point source pollution

Zhulu Lin, Ph.D.

University of Georgia, 2003

Research Area/Activity: Water and Soil Resources, Environmental Modeling

Mark Andrew Meister, Ph.D.

University of Nebraska, 1997

Research Area/Activity: Environment, Rhetoric, Weather, Farming, Food

Devan McGranahan, Ph.D.

Iowa State University, 2011

Research Area/Activity: Fire behavior and ecology, plant community ecology, fire and grazing management, and effects of global environmental change in rangeland ecosystems worldwide

Jack E. Norland, Ph.D.

North Dakota State University, 2008

Research Area/Activity: Restoration Ecology, Application of remote sensing to natural resources management, Study of natural resources management problems in a socio-ecological setting including urban systems

Deirdre Prischmann-Voldseth, Ph.D.

Washington State University, 2005

Research Area/Activity: Integrated Pest Management, Biological Control, Insect Ecology

David A. Rider, Ph.D.

Louisiana State University, 1988

Research Area/Activity: Insect Systematics

David Ripplinger, Ph.D.

North Dakota State University, 2012

Research Area/Activity: Bioproducts / Bioenergy Economics

David Roberts, Ph.D.

Oklahoma State University, 2009

Research Area/Activity: Agricultural Production Methods, Precision Agriculture Technologies, Biofuels Policy

Kevin Sedivec, Ph.D.

North Dakota State University, 1994

Research Area/Activity: Plant Community Ecology, Grazing and Wildlife Interaction, Reclamation of Energy Developed Lands, Range Nutrition, Range Monitoring

Halis Simsek, Ph.D.

North Dakota State University, 2012

Research Area/Activity: Water and Wastewater Treatment, Animal and Agricultural Waste Management

Dean D. Steele, Ph.D.

University of Minnesota, 1991

Research Area/Activity: Irrigation and Environmental Engineering

Joseph D. Zeleznik, Ph.D.

Michigan State University, 2001

Research Area/Activity: Dendrochronology of Ponderosa Pine and Bur Oak, Bur Oak Regeneration, Riparian Forest Restoration

New Institutional Social Science

Department Information

- **Program Coordinator:**
Jeremy Jackson, Ph.D.
- **Email:**

jeremy.jackson@ndsu.edu

- **Department Location:**
400 Barry Hall
- **Department Phone:**
(701) 231-7790
- **Credential Offered:**
Certificate

Overview

A New Institutional Social Science certificate expands the graduate student experience and opens up job opportunities by exposing students to diverse tools and ideas surrounding institutions and policies. Students will pursue research topics addressing society's grand challenges and learn how institutions guide our political, economic, and social interactions.

Eligibility

The certificate program is open to any student enrolled in an NDSU Graduate School program (masters or doctoral). The program has no additional admissions requirements.

To Apply

Students enrolled in the NDSU Graduate School can add the certificate to their degree program by completing and submitting this form (<https://na3.docusign.net/Member/PowerFormSigning.aspx?PowerFormId=c1cb9cfb-01ab-4aed-8b40-d52dec10498&env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&v=2>).

Students are responsible for filling out the top section of the form and providing contact information for members of their home department. The Certificate Program Coordinator for the NISS certificate is Jeremy Jackson, jeremy.jackson@ndsu.edu. If you have questions regarding the form, please contact Melissa Selders-Ortez at melissa.seldersortez@ndsu.edu.

Certificate Requirements

Code	Title	Credits
Required Courses		
NISS 701	Survey of New Institutional Social Science	1
NISS 710	Workshop in New Institutional Social Science	3
ECON 762	New Institutional Economics	3
POLS 762	New Institutionalism in Political Science	3
Elective Course		
PSYC 670 or SOC 733	Experimental Social Psychology Organizations and the State	3
Total Credits		13

Nursing

Department Information

- **Department Chair:**
Carla Gross, RN, Ph.D.
- **Department Location:**
Aldevron Tower 540
- **Department Phone:**
(701) 231-5692
- **Department Web Site:**
www.ndsu.edu/nursing/ (<http://www.ndsu.edu/nursing/>)
- **Application Deadline:**
Doctor of Nursing Practice, January 31 for BSN to DNP fall admission. BSN to DNP requires a March interview.
- **Credential Offered:**
D.N.P - FNP

- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Doctor of Nursing Practice degree, a clinical doctorate, is offered in the Family Nurse Practitioner specialty. The program includes advanced nursing courses, support courses, clinical practica and clinical disquisition.

Guidelines provided by the American Association of Colleges of Nursing (AACN) and the National Organization of Nurse Practitioner Faculties (NONPF) are utilized in the curriculum. The graduate nursing program is accredited by the Commission on Collegiate Nursing Education (CCNE).

1. Baccalaureate degree in nursing from a nationally accredited nursing program.
 2. Undergraduate coursework in research and health assessment.
 3. Current unencumbered RN licensure
 4. Completed application to the Graduate School.
 - a. Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference.
 - b. Written narrative of professional experience and future goals.
 5. Interviews required for applicants on either the first or second Friday and Saturday of March. Dates will be determined by the NDSU School of Nursing and will be posted on their website.
-
1. Family Nurse Practitioner/Doctor of Nursing Practice: A minimum of 86 (DNP) semester credits.
 2. A maximum of nine graduate semester credits (with a grade of B or better) completed within seven years previous to admission, may be transferred from other regionally accredited colleges or universities with the consent of the student's supervisory committee.
 3. Clinical Dissertation

Code	Title	Credits
Core Course Requirements		
NURS 801	Theoretical Perspectives of the Discipline	3
NURS 802	Ethics and Health Policy in Nursing	2
NURS 804	Nursing Research/Evidence Based Practice	3
NURS 806	Health Care Delivery Systems, Financing and Informatics	3
Family Nurse Practitioner Requirements (DNP)		
NURS 715	Advanced Community Assessment	
NURS 810	Health Promotion and Disease Prevention	
NURS 812	Advanced Health Assessment	
NURS 812P	Assessment Practicum	
NURS 814	Advanced Pathophysiology Across the Lifespan I	
NURS 816	Advanced Pathophysiology Across the Lifespan II	
NURS 820	Advanced Practice Roles	
NURS 830	Clinical Applications	
NURS 831	Advanced Pharmacology I	
NURS 832	Advanced Pharmacology II	
NURS 833	Family Primary Care I: Assessment and Management	
NURS 833P	Family Primary Care: Residency I	
NURS 834	Family Primary Care II: Assessment and Management	
NURS 834P	Family Primary Care: Residency II	
NURS 835	Family Primary Care III: Assessment and Management	
NURS 835P	Practicum IV: FNP Role Integration	
NURS 836P	Practicum V: FNP Role Integration	
NURS 850P	Family Primary Care: Specialty Practicum	
NURS 880	Interprofessional Collaborative Practice	
STAT 725	Applied Statistics	
NURS 899S	Clinical Dissertation	
Total Credits		86

Mykell Barnacle, DNP, FNP

North Dakota State University, 2008

Kerri L. Benning, MSN, FNP

University of North Dakota, 2015

Kelly Buettner-Schmidt, Ph.D., RN, FAAN

University of New Mexico, 2013

Kara Falk, DNP, FNP

Montana State University, 2016

Carla Gross, Ph.D., RN

North Dakota State University, 2012

Dean Gross, Ph.D., FNP

Rush University, 1998

Loretta Heuer, Ph.D., FAAN

University of North Dakota, 1995

Adam Hohman, DNP, FNP

North Dakota State University, 2008

Tina Lundeen, DNP, FNP

North Dakota State University, 2010

Allison Peltier, DNP, FNP

North Dakota State University, 2015

Heidi Saarinen, DNP, FNP

North Dakota State University, 2010

Pharmaceutical Sciences

Department Information

- **Department Chair:**
Jagdish Singh, Ph.D.
- **Department Location:**
136 Sudro Hall
- **Department Phone:**
(701) 231-7661
- **Department Web Site:**
www.ndsu.edu/pharmacy (<http://www.ndsu.edu/pharmacy/>)
- **Application Deadline:**
March 15 for fall semester and October 1 for spring semester, if positions are available.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE (300 or more)
- **English Proficiency Requirements:**
TOEFL iBT 90; IELTS 6.5

Program Description

The Department of Pharmaceutical Sciences offers graduate study leading to the Master of Science and Doctor of Philosophy degrees. Advanced work may be selected from pharmaceuticals, pharmacokinetics, pharmacology, and medicinal chemistry."

The pharmaceutical sciences curriculum consists of a core of courses involving both basic and pharmaceutical sciences. In addition, students will select courses that will prepare them to be competent scientists in their fields.

Admissions Requirements

The Department of Pharmaceutical Sciences graduate program is open to all qualified graduates of recognized universities and colleges. In addition to the Graduate School requirements, the applicant must have adequate preparation in pharmacy or a biological or physical science related to pharmaceutical sciences.

Students interested in the Master of Science degree should contact the Department of Pharmaceutical Sciences for more information.

Financial Assistance

Graduate assistantships are available. To be considered for an assistantship, the student must have completed a Graduate School application, be accepted by the department, and submit a formal letter to the department chair requesting an assistantship.

Doctor of Philosophy

The Doctor of Philosophy program requires the completion of 30 semester credits of letter-graded course work with a GPA of 3.0 or better. Of the 30 credits, at least 18 credits must be at 700 level. Candidates defend their dissertations. Candidates for the Ph.D. will be required to take an examination directed at determining competency in the pharmaceutical sciences.

The department requires the following core courses:

Code	Title	Credits
PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 670	Pharmacokinetics	3
PSCI 790	Graduate Seminar	1-3
BIOC 701	Comprehensive Biochemistry I	4
BIOC 702	Comprehensive Biochemistry II	4
STAT 725	Applied Statistics	3

Master of Science

In consultation with the adviser and student's supervisory committee a Plan of Study would be developed. The Master of Science in Pharmaceutical Sciences program follows Graduate College degree requirements (<https://bulletin.ndsu.edu/graduate/graduate-school-policies/masters-program-policies/>).

Ang Guo, Ph.D.

Shanghai Institute for Biological Sciences, Chinese Academy of Sciences in 2010

Postdoctoral: University of Iowa 2015

Research Assistant Professor 2019

Research Interests: Cardiovascular Pharmacology and Pathophysiology

Yagna Jarajapu, M.Pharm., Ph.D.

University of Strathclyde, 1998

Glasgow Caledonian University, 2002

Postdoctoral: University of Florida and Wake Forest University 2003-2008

Research Interests: ACE2/Angiotensin-(1-7) and Bone Marrow Progenitor Cells in Diabetes

Buddhadev Layek, Ph.D.

North Dakota State University, 2014

Postdoctoral: University of Minnesota 2017

Researcher 5, University of Minnesota, 2020

Research Interests: Pharmacokinetic, toxicokinetic, and metabolic profiling of small molecule drug candidates and biologics

Estelle Leclerc, Ph.D.

University Paris XI, 1994

Postdoctoral: ETH-Zurich, 1994-1998; The Scripps Research Institute, 1998-2003

Junior Group Leader Children's Hospital Zurich, 2004

Research Assistant Professor Florida Atlantic University, 2005-2009

Research Interests: Biopharmaceutics

Sanku Mallik, Ph.D.

Case Western Reserve University, 1992

Postdoctoral: California Institute of Technology, 1993-95

Research Interests: Synthetic medicinal chemistry

Sijo Mathew, Ph.D.

Central Food Technological Research Institute, Mysore, India , 2006

Postdoctoral: University of Tennessee, 2008 and Vanderbilt University Medical Center, 2012

Research Interests: Kidney disease, pancreatic Cancer, Biopharmaceutics

Stephen T. O'Rourke, Ph.D.

University of Wisconsin, 1985

Postdoctoral: Mayo Clinic and Foundation, 1985-87

Research Interests: Vascular Pharmacology

Jagdish Singh, Ph.D.

Banaras Hindu University, 1982

Postdoctoral: University of Otago, New Zealand, 1985-88; University of California–San Francisco, 1992-94

Research Interests: Novel Dosage and Drug Delivery Systems, Biopharmaceutics

Kristine Steffen, Pharm.D., Ph.D.

North Dakota State University, 2002

North Dakota State University, 2007

Postdoctoral: Neuropsychiatric Research Institute, 2007-2009

Research Interests: Pharmacokinetics, Bariatric Surgery, Eating Disorder and Obesity Pharmacotherapy

Chengwen Sun, M.D., Ph.D.

Norman Bethune University of Medical Sciences, 1988

Norman Bethune University of Medical Sciences, 1996

Postdoctoral: Department of Physiology, Medical College of Wisconsin, 1996-2000

Research Interests: Central Blood Pressure Control and Hypertension Gene Therapy

Sathish Venkatachalem, Ph.D.

University of Madras, 2003

Postdoctoral: University of Western Ontario, 2004-2006

Research Interests: Human Lung Diseases (Asthma, Chronic Obstructive Pulmonary Disease and Pulmonary Hypertension)

Stefan Vetter, Ph.D.

Swiss Institute of Technology (ETH) Zurich, 1998

Postdoctoral: The Scripps Research Institute, 2000-2005

Research Interest: Medicinal Protein Biochemistry

Physics

Department Information

- **Department Chair:**
Sylvio May, Ph.D.
- **Graduate Coordinator:**
Warren Christensen, Ph.D.
- **Department Location:**
218 South Engineering
- **Department Phone:**
(701) 231-8974
- **Department Web Site:**
www.ndsu.edu/physics/ (<http://www.ndsu.edu/physics/>)
- **Application Deadline:**
For U.S. students, one month before registration; for international students, March 1 for fall semester and September 1 for spring/summer semester.
- **Credential Offered:**
Ph.D., M.S., Accelerated M.S.
- **Test Requirement:**
GRE (general and subject recommended)

• **English Proficiency Requirements:**

RA-TOEFL iBT 79, IELTS 6; TA- TOEFL iBT 81 (Speaking 23, Writing 21), IELTS 7 (Speaking 6, Writing 6)

Program Description

The Department of Physics offers graduate study leading to the M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: biophysics, computational physics, condensed matter, nanomaterials, physics education research, polymer physics, soft matter physics, and statistical mechanics.

Research and academic programs are tailored to meet individual needs and interests. New students are strongly urged to visit faculty members to discuss research opportunities soon after their arrival.

Admissions Requirements

The Department of Physics graduate program is open to all qualified graduates of universities and colleges of recognized standing.

Financial Assistance

Prospective students must apply to the Graduate School and be accepted in full or conditional status before being eligible for an assistantship in the Department of Physics.

Generally, graduate students are supported during the academic year by either teaching assistantships or research assistantships. The 2019-2020 academic year stipend is \$19,500 for 9 months. Additional support during the summer is also possible. Graduate tuition (but not student fees) is fully waived for all teaching assistants and research assistants.

Research Equipment

NDSU's Materials and Nanotechnology Center is located in the Research and Technology Park. The Center is equipped with two state-of-the-art wet labs, a synthesis lab, optical characterization facilities (optical/NIR fluorescence microscopy, laser-scanning confocal microscopy, and light scattering/reflectometry), and surface characterization facilities (nano-indentation and atomic-force microscopy). There are seven fume hoods in the lab space, as well as a number of synthesis tools, including a Beckman Coulter Optima L-80 XP Ultracentrifuge. We also have access to state-of-the-art chemical synthesis facilities in the Departments of Chemistry and Biochemistry and Coatings and Polymeric Materials, including a Photo Emissions Tech Model SS50AAA Solar Simulator equipped with a Keithley 2400 Series Source meter. NDSU's Center for Computationally Assisted Science and Technology (CCAST) provides large-scale computing resources to NDSU users.

The Graduate Coordinator or Chair shall assign to each incoming graduate student a temporary adviser, who shall assist in the selection of courses. During the first semester, the student is expected to discuss potential projects for thesis research with faculty members. By the beginning of the second semester, the student must have a permanent research supervisor. By the end of the second semester, the student must have filed a plan of study, selected a thesis topic, and secured two additional faculty members for the Advisory Committee.

Master of Science

Code	Title	Credits
Physics courses number 601-689 or 700-789		10
Didactic courses numbered 601-689 or 700-789		16
PHYS 790	Graduate Seminar	1
PHYS 798	Master's Thesis	6-10
Total Credits		30

Students are required to attend all seminars and colloquia.

Accelerated Master of Science

Code	Title	Credits
PHYS 790	Graduate Seminar	1
Choose from the following:		21
PHYS 611	Optics for Scientists & Engineers	
PHYS 611L	Optics for Scientists and Engineers Lab	
PHYS 613	Lasers for Scientists and Engineers	
PHYS 615	Elements of Photonics	
PHYS 662	Thermal and Statistical Physics	

PHYS 681	Condensed Matter Physics	
PHYS 685	Quantum Mechanics I	
PHYS 686	Quantum Mechanics II	
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	
PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 798	Master's Thesis	6-8
Total Credits		30

Students must meet all requirements of the Physics bachelor and master programs. For the master's degree, students must earn at least 30 graduate credits, numbered 601-798, with these conditions:

- Up to 15 credits from this list may count toward the bachelor program requirements. It is recommended that students take the 600-level of PHYS 462/662, 481/681, 485/685, and 486/686 while fulfilling the requirements for the bachelor's degree.
- Between 6 and 8 credits are PHYS 798 (Master's Thesis), with the goal to publish a paper based on the thesis research, although this is not a requirement to graduate.
- At least one credit is PHYS 790 Graduate Seminar.

Doctoral Degree

Code	Title	Credits
Required Courses		16
PHYS 752	Mathematical Methods in Physics I	
PHYS 758	Statistical Physics	
PHYS 761	Electromagnetism	
PHYS 771	Quantum Physics I	
PHYS 781	Solid State Physics	
PHYS 790	Graduate Seminar	
Letter-graded courses number 601-689 or 700-789		27
PHYS 899	Doctoral Dissertation	
Total credits		90

Credits used to satisfy the requirements for the M.S. degree may be included in the total. Students are required to attend all seminars and colloquia.

Comprehensive Examination

By the end of their fourth semester, students:

- submit a report that summarizes their research results so far and details a research plan for the rest of their research work;
- give a talk about their research accomplishments and plans; and
- must pass an oral examination by the Advisory Committee to confirm doctoral candidacy.

Students who pass the comprehensive examination and, at the time of the exam, have completed 30 credits (16 of which are didactic) will earn a master's degree and be eligible to participate in commencement that semester. Students should choose the Ph.D. + master's option from the drop-down menu on the Doctoral Degree Plan of Study and on the Request to Schedule Examination. After students have passed the comprehensive examination, they should complete the Exit Survey and the Degree Application. A link to these items will be emailed to them by the Graduate School.

If the student fails the comprehensive examination, she/he will be given the opportunity to repeat the examination in the next semester (this examination can be repeated only once). Alternatively, the student may elect to work for a master's degree instead.

Students should submit their doctoral thesis for examination at the end of their fourth year

Dissertation Video

Doctoral students are required to submit a three-minute video summarizing their dissertation research for a lay audience. The video should be produced, with guidance from the thesis supervisor, during the final semester of study and presented to the supervisory committee at the final defense.

For the comprehensive and final examinations, students must submit the appropriate forms to the Graduate School.

Warren Christensen, Ph.D.

Iowa State University, 2007

Postdoctoral: University of Maine, 2007-2009

Research Interests: Physics Education Research, Student Content Understanding, Curriculum Development

Yongki Choi, Ph.D.

The City University of New York, 2010

Postdoctoral: University of California Irvine, 2010-2014

Research Interests: Nano-Bio-physics, Nano-electronics, Single-Molecule science

Andrew Croll, Ph.D.

McMaster University, 2009

Postdoctoral: University of Massachusetts, 2008-2010

Research Interests: Polymers, Diblock Copolymers, Thin Films, Pattern Formation, Mechanics

Alan R. Denton, Ph.D., Graduate Coordinator

Cornell University, 1991

Postdoctoral: University of Guelph, 1991-94; Technical University of Vienna, 1994-95, Research Center Julich, 1996-98

Research Interests: Soft Condensed Matter Theory, Computational Physics

Eric Hobbie, Ph.D.

University of Minnesota, 1990

Research Interests: Nanotechnology, Nanoparticles, Polymers, Optics and Rheology

Andrei Kryjevski, Ph.D.

University of Washington, 2004

Research Interests: First-Principles Numerical Techniques for Fermi Systems, Electronic Structure of Nanoparticles

Mila Kryjevskaja, Ph.D.

University of Washington, 2008

Research Interest: Physics Education Research

Sylvio May, Ph.D., Department Chair

Friedrich-Schiller University, 1996

Postdoctoral: Hebrew University Jerusalem, 1997-98

Research Interests: Physics of Lipid Membranes, Biophysics, Ionic Liquids, Drug delivery

Orven Swenson, Ph.D.

Air Force Institute of Technology, 1982

Research Interests: Laser Materials Processing, Optics Education

Alexander J. Wagner, Ph.D.

University of Oxford, 1997

Postdoctoral: MIT, 1998-2000, Edinburgh, 2000-2002

Research Interests: Computational Soft Matter, Phase Separation, Diffusion, Interfaces Physics

Emeritus

Ghazi Q. Hassoun, Ph.D.

University of Minnesota, 1963

Postdoctoral: University of Michigan, 1963-65

Research Interests: Foundations of Quantum Mechanics

Daniel M Kroll, Ph.D.

University of Chicago, 1973

Research Interests: Theoretical and Computational Modeling of Complex Fluids and Biomembranes

Charles A. Sawicki, Ph.D.

Cornell University, 1975

Postdoctoral; Cornell University, 1975-79

Research Interests: Acoustics, Biophysics, Geophysics

Mahendra K. Sinha, Ph.D.

Pennsylvania State University, 1961

Postdoctoral: National Research Council (Ottawa), 1964-66

Research Interests: Field Emission and Field-Ion Microscopy Adjunct

Adjunct Faculty

Stuart Croll, Ph.D.

University of Leeds, 1974

Research Interests: Weathering Durability, Film Formation, Internal Stresses In Films, Modern Art Conservation, and History of Paint Technology

Khang Hoang, Ph.D.

Michigan State University, 2007

Research Interests: Materials theory, Defect physics, Solid state ionics

Dane Skow, Ph.D.

University of Rochester, 1990

Research Interests: High Energy Physics

Plant Pathology

Department Information

- **Department Chair:**
Jack Rasmussen, Ph.D.
- **Department Location:**
Walster Hall
- **Department Phone:**
(701) 231-8362
- **Department Web Site:**
www.ag.ndsu.edu/plantpath/ (<http://www.ag.ndsu.edu/plantpath/>)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Plant Pathology offers graduate study leading to the M.S. and Ph.D. degrees. Advanced degrees may involve specialized training in the following areas: host-parasite genetics, molecular biology and genomics, epidemiology, soil and seed-borne diseases, microbial ecology, and integrated disease management.

Student research and academic programs are tailored to individual needs and interests.

Five graduate faculty members are housed in the Northern Crops Science Laboratory located on campus. This relationship provides additional opportunities for research and consultation.

The Department of Plant Pathology graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 975), the applicant must have adequate preparation in Plant Pathology or Biology.

Financial Assistance

Research assistantships and part-time positions are available in the department. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be submitted. In addition to these materials, international applicants must also submit TOEFL scores. These items must be submitted to the Graduate School.

Master of Science

Completion of a Master of Science degree is dependent on the completion of 30 semester hours in Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. No minor area of study is required with an MS degree, but a minor may be elected.

Doctor of Philosophy

Completion of a Doctor of Philosophy degree is dependent on the completion of 60 semester hours beyond the MS degree or 90 credits total. Courses may include Plant Pathology or approved courses from related departments. Not less than 10 credits must reflect research in the desired area. A minor area of study is required with a PhD degree. Options are available in plant science, agronomy, plant breeding, microbiology, entomology and others.

Thomas Baldwin, Ph.D.

University of Georgia, 2013

Research Interests: Barley-Pathogen Interactions, RNA-Interference, Fungal Genetics, Fusarium head blight

Luis del Rio, Ph.D.

Iowa State University, 1999

Research Interests: Epidemiology of Plant Diseases, Chemical and Biological Control of Fungal Diseases, Management of Canola Diseases

Andrew Friskop, Ph.D.

North Dakota State University, 2013

Research interests: Extension Plant Pathology, Chemical Control, Corn Diseases, Small Grain Diseases, IPM

Upinder Gill, Ph.D.

Washington State University, 2012

Research Interests: Management of rust diseases of wheat and other field crops, Genetics and genomics of host-pathogen interactions

Mohamed Khan, Ph.D.

Clemson University, 1998

Research Interests: Sugarbeet Management

Janet J. Knodel, Ph.D.

North Dakota State University, 2005

Research Interests: Extension Entomology, IPM of Field Crop Insects, Insect-Disease Surveys, Emerging Insects, Chemical Control

Zhaohui Liu, Ph.D.

North Dakota State University, 2006

Research interests: Molecular biology and genetics of host-pathogen interactions in wheat leaf spot diseases

Samuel Markell, Ph.D.

University of Arkansas, 2007

Research Interests: Extension Plant Pathology, Rust Diseases, IPM, Emerging Diseases, Chemical Control

Steven W. Meinhardt, Ph.D.

University of Illinois, 1984

Research Interests: Structure/Function Relationships in Enzymes and Toxins

Berlin D. Nelson, Ph.D.

Washington State University, 1979

Research Interests: Oilseed Diseases, Biological Control, Mycology

Jack B. Rasmussen, Ph.D.

Michigan State University, 1987

Research Interests: Molecular Biology and Role in Disease of Pathogen-Produced Toxins, Genetics of Resistance to Cereal Rust Diseases

Gary A. Secor, Ph.D.

University of California-Davis, 1978

Research Interests: Potato Diseases Management and Control, Biotechnology for Cultivar Improvement

Julie Sherman Pasche, Ph.D.

North Dakota State University, 2012

Research Interests: Potato disease management, fungicide efficacy and resistance management, pathogen detection and diversity

Guiping Yan, Ph.D.

Washington State University, 2006

Research Interests: Detection, biology and management of soybean cyst nematode and other plant-parasitic nematodes in field crops.

Shaobin Zhong, Ph.D.

North Dakota State University, 2000

Research Interests: Fusarium Head Blight of Wheat, Fungal Biology and Genetics, Genomics and Functional Genomics of Host-Pathogen Interaction in Cereal Crops

Adjunct

Timothy L. Friesen, Ph.D.

USDA/ARS

North Dakota State University, 2001

Research Interests: Host Parasite Interactions of Foliar Diseases of Cereals

Michael C. Edwards, Ph.D.

USDA/ARS

Cornell University, 1983

Research Interests: Virology, Cereal Virus Diseases

Rubella Goswami, Ph.D.

University of Minnesota, 2005

Research Interests: Pathogen Interactions, Fungal Biology, Molecular Biology and Genomics

Thomas J. Gulya, Ph.D.

USDA/ARS

Iowa State University, 1978

Research Interests: Downy Mildew, Rust, Phomopsis Stem Canker, Sclerotinia Wilt of Sunflower

Michael Wunsch, Ph.D.

Cornell University, 2010

Research Interests: Varietal Disease Resistance, Fungicide Efficacy and Timing, and Use of Cropping Systems

Plant Sciences/Horticulture

Department Information

- **Department Head:**
Richard Horsley, Ph.D.
- **Graduate Coordinator:**
Edward Deckard, Ph.D.
- **Department Location:**
166 Loftsgard Hall
- **Department Phone:**
(701) 231-7971
- **Department Web Site:**
www.ag.ndsu.edu/plantsciences/ (<http://www.ag.ndsu.edu/plantsciences/>)
- **Application Deadline:**
International applications are due May 1 for Fall and October 15 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D. (Plant Sciences only), M.S.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Plant Sciences offers graduate studies leading to the M.S. degrees in Cereal Science, Plant Sciences, and Horticulture, and to a Ph.D. degree in Cereal Science or Plant Sciences, with an optional Program of Emphasis in Plant Breeding and Genetics. Specialized academic and research training in Plant Sciences is available in plant breeding and genetics, weed science, biotechnology, and field and forage crop production

and management. Areas of specialization in Horticulture and Forestry include breeding and genetics, biotechnology, physiology, propagation, sports and urban turfgrass management, and production and management of horticultural crops such as woody plants, potatoes, vegetables, and herbaceous ornamentals. Areas of specialization in Cereal Science may involve research in the areas of carbohydrates, enzymes, legumes, and other northern-grown crops; barley malting and brewing; wheat milling, baking, and pasta processing. Each study area is designed to provide students with comprehension of the discipline and of relevant regional and global-community social issues.

The Department of Plant Sciences is located in Loftsgard Hall, which provides a state-of-the-art facility for interdisciplinary research in plant sciences, ranging from basic studies and biotechnology to the more traditional applied areas. Facilities for cereal science research are located in Harris Hall. These facilities include analytical laboratories for grain quality research, baking, milling, malting and brewing, and pasta and noodle processing. State-of-the-art greenhouses and extensive growth chamber facilities are also available, as are 100 acres of field research land adjacent to the Plant Science Complex. An additional 500 acres of research land are located near the North Dakota State University campus. A horticultural farm only 25 miles west of campus has an extensive arboretum. Excellent supporting disciplines located nearby, or in the Plant Science Complex, include Soil Science, Botany, Food Safety, Biochemistry and Molecular Biology, Entomology, and Plant Pathology. The Department of Plant Sciences encourages interdisciplinary research, and students frequently tailor their research program to meet their interests by working with faculty in one or more of the supporting disciplines.

Graduate student numbers per faculty member are limited, so the student gets adequate personal attention and works closely with their adviser in research. Final selection of the adviser will be made on the basis of the student's interest, availability of space in the researcher's laboratory, and a common desire of the student and professor to work together.

The Department of Plant Sciences graduate programs are open to all qualified graduates of universities and colleges of recognized standing. To be admitted with full status to the program, the applicant must meet Graduate School and Department admission requirements.

Students who do not meet specific requirements for admission but show potential for successful graduate study may be admitted under a conditional status. Evidence must be provided showing that the applicant's potential is not adequately reflected by their record.

Financial Assistance

Graduate research assistantships (half-time) are provided on a competitive basis based on scholarship and potential to undertake advanced study and research. The information provided within the application to Graduate School is used to assign available assistantships to applicants. Currently, the annual stipend is \$17,772 for a M.S. candidate and \$19,032 for a Ph.D. candidate but this may vary based on the research project. Graduate tuition is waived for all students with a graduate research assistantship who meet the hours worked requirement each semester.

A limited number of graduate fellowships are available. The Department of Plant Sciences has numerous annual scholarships of \$500 to \$1,000 each for outstanding Plant Sciences graduate students.

Degree Programs

The M.S. Program, Thesis Option, requires completion of at least 30 credits; this includes 10 credits of thesis research (PLSC 798).

An M.S. Program, Comprehensive Study Option, is also offered in Plant Sciences. This option requires completion of at least 30 credits, including 3 credits of a Master's Paper (PLSC 797).

The Ph.D. Program requires completion of at least 90 credits; this includes 30 credits for an earned M.S. degree (Thesis Option), 2 credits from two teaching experiences (PLSC 892), 2 additional credits of seminar (PLSC 790), and 20 additional research credits (PLSC 899). An optional Ph.D. Program of Emphasis in Plant Breeding and Genetics is available with additional course requirements as mentioned on the departmental website.

See the tables below for program requirements

For each M.S. or Ph.D. candidate, a plan of study will be developed in the first year that meets the disciplinary requirements as well as the individual needs of the student. The faculty adviser and other members of the student's supervisory/advisory and examining committee assist in developing of the plan of study as well as the student's research plan. Candidates for the M.S. degree programs normally satisfy all requirements within a two-year period. Ph.D. candidates normally require three additional years. For M.S. candidates, an oral examination of academics related to the discipline and the research-based thesis is required. The Ph.D. candidates are required to pass a preliminary written and oral examination of academics related to the discipline and a final oral defense of a research-based dissertation.

A B.S. to Ph.D. program is permitted for students who meet higher admission requirements.

Code	Title	Credits
M.S. Plan A - Thesis Option		30
600-700 level courses including 3 credits of PLSC 724 or equivalent		19
16 of which must be in didactic courses approved for graduate credit numbered 600-689 and 700-789		
PLSC 790	Graduate Seminar	1
PLSC 798	Master's Thesis	10
M.S. Plan B - Comprehensive Study Option		30

600-700 level courses including 3 credits of PLSC 724 or equivalent 26

21 of the 30 credits must be in didactic courses approved for graduate credit numbered 600-689 and 700-789

PLSC 790	Graduate Seminar	1
PLSC 797	Master's Paper	3

Code	Title	Credits
M.S. (thesis option) to Ph.D.		60
600 - 800 level courses (including PLSC 724 if not part of MS)		36
27 of which must be didactic courses numbered 601-689, 700-789, or 800-889		
15 of the 27 must be 700-789 or 800-889		
PLSC 790	Graduate Seminar	2
PLSC 892	Graduate Teaching Experience	2
PLSC 899	Doctoral Dissertation	20

Faculty

Nonoy Bandillo, Ph.D.

University of Nebraska-Lincoln, 2016

Research Interests: Pulse Breeding, Genetics

Marisol Berti, Ph.D.

North Dakota State University, 2007

Research Interests: Forage and Biomass Crop Production

Xiwen Cai, Ph.D.

Washington State University, 1998

Research Interests: Wheat Genetics

Bingcan Chen, Ph.D.

University of Massachusetts, 2012

Research Interests: Cereal and Food Chemistry

Michael J. Christoffers, Ph.D.

University of Missouri-Columbia, 1998

Research Interests: Weed Science/Genetics

David Wenhao Dai, Ph.D.

North Dakota State University, 2001

Research Interests: Woody Plant Physiology, Biotechnology

Edward L. Deckard, Ph.D.

University of Illinois, 1970

Research Interests: Crop Physiology

Elias M. Elias, Ph.D.

North Dakota State University, 1987

Research Interests: Durum Wheat Breeding, Genetics

Greta Gramig, Ph.D.

University of Wisconsin-Madison

Research Interests: Weed Biology and Ecology

Andrew J. Green, Ph.D.

Kansas State University, 2016

Research Interests: Hard Red Spring Wheat, Genetics

Harlene Hatterman-Valenti, Ph.D.

Iowa State University, 1993

Research Interests: High-Value Crop Production

Richard D. Horsley, Ph.D.

North Dakota State University, 1988

Research Interests: Barley Breeding, Genetics

Kirk A. Howatt, Ph.D.

Colorado State University, 1999

Research Interests: Weed Science, Annual Weeds

Joseph Ikley, Ph.D.

Purdue University, 2018

Research Interests: Weed Control

Burton L. Johnson, Ph.D.

North Dakota State University, 1993

Research Interests: Crop Production

Thomas J. Kalb, Ph.D.

Virginia Polytechnic Institute & State University, 1988

Research Interests: Extension Horticulture

Herman J. Kandel, Ph.D.

North Dakota State University, 1995

Research Interests: Crop Production

Chiwon W. Lee, Ph.D.

Purdue University, 1977

Research Interests: Vegetables, Floriculture, Biotechnology

Deying M. Li, Ph.D.

Iowa State University, 2001

Research Interests: Sports Turf Management

Xuehui Li, Ph.D.

University of Georgia, 2009

Research Interests: Statistical Genomics

Frank A. Manthey, Ph.D.

North Dakota State University, 1985

Research Interests: Durum Wheat Quality, Pasta/Noodle Processing

G. Francois Marais, Ph.D.

North Dakota State University, 1979

University of Stellenbosch, 1992

Research Interests: Hard Red Winter Wheat Breeding, Genetics

Phillip E. McClean, Ph.D.

Colorado State University, 1982

Research Interests: Dry Bean Genetics, Biotechnology

Esther E. McGinnis

University of Minnesota, 2013

Research Interests: Extension Horticulture, Native Plants, Perennial Hardiness, Floriculture

Michael S. McMullen, Ph.D.

University of Minnesota, 1976

Research Interests: Oat Breeding, Genetics

Carrie Miranda, Ph.D.

University of Missouri, 2018

Research Interests: Soybean Breeding, Molecular Genetics

Rebekah Oliver, Ph.D.

North Dakota State University, 2006

Research Interests: Genetics

Juan Osorno, Ph.D.

North Dakota State University, 2006

Research Interests: Dry Edible Bean Breeding

Thomas Peters, Ph.D.

North Dakota State University, 1990

Research Interests: Sugarbeet Agronomy, Weed Science

Mukhlesur Rahman, Ph.D.

University of Manitoba, 2007

Research Interests: Canola Breeding

Jiajia Rao, Ph.D.

University of Massachusetts, 2013

Research Interests: Food Chemistry, Ingredient Technology

Andy Robinson, Ph.D.

Purdue University, 2012

Research Interests: Potato Production

Paul B. Schwarz, Ph.D.

North Dakota State University, 1987

Research Interests: Malting Barley Quality

Kalidas Shetty, Ph.D.

University of Idaho, 1989

Research Interests: Food Safety

Senay Simsek, Ph.D.

Purdue University, 2006

Research Interests: Hard Spring Wheat Quality

Asunta L. Thompson, Ph.D.

University of Idaho, 1998

Research Interests: Potato Breeding

Anuradha Vegi, Ph.D.

North Dakota State University, 2008

Research Interests: Teaching Techniques

Todd West, Ph.D.

Southern Illinois University, 2004

Research Interests: Woody Plant Improvement

Qi Zhang, Ph.D.

Kansas State University, 2007

Research Interests: Turfgrass Stress Physiology

Alan J. Zuk, Ph.D.

Kansas State University, 2005

Research Interests: Sports and Urban Turfgrass Management

Adjunct and Affiliate

James V. Anderson, Ph.D.

Virginia Polytech Institute, 1990

Research Interests: Plant Biochemistry

James Beaver, Ph.D.

University of Illinois, 1980

Research Interests: Dry Bean Genetics

David Bonnett, Ph.D.

University of Sydney, 1997

Research Interests: Wheat Breeding

Patrick M. Carr, Ph.D.

Montana State University, 1989

Research Interests: Sustainable Agriculture

Wun Shaw Chao, Ph.D.

University of California-Davis, 1996

Research Interests: Perennial Weeds

Munevver Dogramaci, Ph.D.

Cukurova University, Institute of Natural and Applied Sciences, Adana, Turkey/North Dakota State University, Fargo, ND, USA, 2000

Research Interests: Sugarbeet and Potato Research

Linda Dykes, Ph.D.

Texas A&M University, 2008

Research Interests: Food Science and Technology

Justin D. Faris, Ph.D.

Kansas State University, 1999

Research Interests: Wheat Molecular Genetics

Jason Fiedler, Ph.D.

Scripps Research Institute, 2012

Research Interests: Cereal Crop Genetics

Shana M. Forster, Ph.D.

North Dakota State University, 2017

Research Interests: Crop Production

Jose G. Franco, Jr., Ph.D.

Texas A&M University, 2015

Research Interests: Agroecology, Sustainable Food Systems

Karen L. Fugate, Ph.D.

Ohio State University, 1995

Research Interests: Sugarbeet Physiology

Russell Gesch, Ph.D.

Texas A&M University, 1995

Research Interests: Physiology of Oilseed Crops

Salvador Alejandro Gezan, Ph.D.

University of Florida, 2005

Research Interests: Statistic and Quantitative Genetics

Michael Grusak, Ph.D.

University of California-Davis, 1985

Research Interests: Crop Nutrient Quality

Yong Q. Gu, Ph.D.

University of California, Riverside, 1994

Research Interests: Wheat Genetics

Darrin Haagenson, Ph.D.

Purdue University, 2001

Research Interests: Crop Physiology and Ecology

David P. Horvath, Ph.D.

Michigan State University, 1993

Research Interests: Perennial Weed Physiology

Brent Hulke, Ph.D.

University of Minnesota, 2007

Research Interests: Flax and Sunflower Genetics

Brian Jenks, Ph.D.

University of Nebraska, Lincoln, 1996

Research Interests: Integrated Weed Management

Blaine Johnson, Ph.D.

University of Nebraska, 1986

Research Interests: Quantitative Genetics

Edward C. Lulai, Ph.D.

North Dakota State University, 1978

Research Interests: Potato Physiology

Kevin McPhee, Ph.D.

University of Idaho, 1995

Research Interests: Pulse Crops

Grant Mehring, Ph.D.

North Dakota State University, 2016

Research Interests: Agronomy; Wheat and Corn Research

Mohamed Mergoum, Ph.D.

Colorado State University, 1991

Research Interests: Hard Red Spring Wheat Breeding

Jae-Bom Ohm, Ph.D.

Kansas State University, 1996

Research Interests: Grain Science

Michael Ostlie, Ph.D.

Colorado State University, 2012

Research Interests: Weed Science

Timothy Porch, Ph.D.

Cornell University, 2012

Research Interests: Dry Bean Breeding and Genetics

Gautam Pradhan, Ph.D.

Kansas State University, 2011

Research Interests: Crop Physiology

Lili Qi, Ph.D.

Nanjing Agricultural University, 1997

Research Interests: Wheat Genetics

Calvin Trostle, Ph.D.

Texas A&M, 1996

Research Interests: Row Crops, Peanut, Alfalfa

Gerald J. Seiler, Ph.D.

North Dakota State University, 1980

Research Interests: Sunflower and Sugarbeet Germplasm

Thomas Walk, Ph.D.

Pennsylvania State University, 2005

Research Interests: Plant Physiology, Statistics

Jochum Wiersma, Ph.D.

University of Minnesota, 1995

Research Interests: Small Grains

Steven S. Xu, Ph.D.

North Dakota State University, 1994

Research Interests: Hard Red Spring Wheat Development

Shengming Yang, Ph.D.

North Dakota State University, 1994

Research Interests: Hard Red Spring Wheat Development

Psychological Clinical Science

Department Information

- **Department Chair:**
Mark Nawrot, Ph.D.
- **Department Location:**
232 B2 Minard Hall
- **Department Phone:**
(701) 231-7065
- **Department Web Site:**
www.ndsu.edu/psychology/graduate_programs/psychological_clinical_science/ (http://www.ndsu.edu/psychology/graduate_programs/psychological_clinical_science/)
- **Application Deadline:**
We are currently not accepting applications into this program.
- **Credential Offered:**
Ph.D.
- **Test Requirement:**
GRE
- **English Proficiency Requirements:**
TOEFL iBT 100; IELTS 7

Program Description

The primary purpose of this program is to prepare students for careers in academic or research settings. Thus, a major emphasis is on research training. We hope to train researchers who will contribute to psychological knowledge through the investigation of clinically relevant issues, including basic research on the nature, etiology, and course of health related problems or psychological disorders, as well as applied research which investigates the prevention and treatment of health and mental health problems.

When making admission decisions, grades, GRE scores, research experience, letters of recommendation (preferably from faculty who can comment on your research skills and academic potential), and the personal statement are considered. To the extent that an applicant has a strong background in psychology, including course work in statistics, research methods, abnormal psychology, and personality, and good research experience, this will be an advantage.

Applicants who already have a master's degree will be judged by the same criteria. For applicants with a master's degree, credit towards the doctorate will depend on how well previous course work matches with the program requirements.

Campus visits or interviews are not required, although the department may arrange for a visit via phone or internet video with top candidates.

Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year. Admission decisions will be made by mid-March. Applications are reviewed once a year and students are admitted for fall semester only.

Students are required to gain a breadth of knowledge in the foundations of psychology through courses in biological, cognitive, and social bases of behavior. Course work in research methods and statistics, assessment, psychopathology, health, and interventions comprise the clinical portion of the curriculum.

Practicums at local hospitals, clinics, and mental health agencies provide supervised experience in service delivery and applied research. This is a full-time program and will take five years, including internship, to complete.

Code	Title	Credits
Evaluation and Intervention		13
Four courses cover content related to the history of clinical psychology, ethics, psychopathology, and current empirically supported approaches to assessment and treatment.		
PSYC 755	Empirically Supported Interventions I	
PSYC 756	Empirically Supported Interventions II	
PSYC 770	Testing and Assessment	
Choose one course on current theories and research on psychopathology with a focus either on adulthood or childhood.		
PSYC 672	Advanced Psychopathology	
PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	

PSYC 795	Field Experience (Clinical Training)
PSYC 794	Practicum/Internship
Fundamentals of Psychology and Breadth	
One course from each of three core categories to include an option for the biological basis of behavior, the cognitive basis of behavior, and the social basis of behavior. These courses are for breadth. Students may choose the particular courses and may take additional elective courses to supplement their knowledge and research skills in Health, Social, Cognition, or Vision.	
Biological Basis of Behavior	
PSYC 660	Sensation & Perception
PSYC 665	Psychobiology
PSYC 686	Neuropsychology
PSYC 718	Visual Neuroscience
Cognitive Basis of Behavior	
PSYC 661	Memory and Knowledge
PSYC 664	Attention & Thinking
PSYC 720	Advanced Topics in Cognitive Neuroscience
Social Basis of Behavior	
PSYC 653	Organizational Psychology
PSYC 670	Experimental Social Psychology
PSYC 771	Social/Health Psychology Research
PSYC 787	Advanced Social Psychology and Health
Research Training	
PSYC 793	Individual Study/Tutorial
PSYC 798	Master's Thesis
or PSYC 899	Doctoral Dissertation
Three courses on research methods	
PSYC 640	Experimental Methods
PSYC 761	Applied Research Methods
PSYC 762	Advanced Research Methods and Analysis
PSYC 790	Graduate Seminar (8 total credits)
Teaching Requirement	
One course and seminar in college teaching.	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences
PSYC 791	Temporary/Trial Topics
PSYC 794	Practicum/Internship

Keith Donohue, Ph.D.

Florida State University, 2011

Field: Clinical; Substance Abuse, Research Methods, and Teaching

Clayton Hilmert, Ph.D.

University of California at San Diego, 2003

Field: Health/Social; Stress, Psychophysiology, and Health

Leah Irish, Ph.D.

Kent State University, 2011

Field: Health/Social; Health Behaviors, Sleep, Stress

Michael D. Robinson, Ph.D.

University of California Davis, 1996

Field: Social/Personality Affective Processes

Psychology

Department Information

- **Department Chair:**
Mark Nawrot, Ph.D.

- **Department Location:**
232 B2 Minard
- **Department Phone:**
(701) 231-8622
- **Department Web Site:**
www.ndsu.edu/psychology/graduate_programs/ (http://www.ndsu.edu/psychology/graduate_programs/)
- **Application Deadline:**
January 15
- **Credential Offered:**
Ph.D., M.S.
- **Test Requirement:**
GRE (optional for fall 2021 applicants)
- **English Proficiency Requirements:**
TOEFL iBT 79, IELTS 6.5

Program Description

The Department of Psychology at North Dakota State University grants both M.S. and Ph.D. degrees. Our doctoral programs prepare students for a range of research-related careers.

Masters Program

Students pursuing a Psychology PhD, who have not previously received a Master's degree in Psychology or a related field, typically complete the requirements for the MS degree in the first two years of their PhD program training. As part of the student's graduate training, students complete course work in areas of departmental research emphasis, as well as methods courses and breadth requirements. Each student will gain research experience under the supervision of a faculty mentor and complete a thesis. Students are not admitted for the sole pursuit of a terminal Masters degree.

Doctoral Programs

Our doctoral program accommodates approximately 20 students, with approximately 4 new Ph.D. degrees awarded each year. Training in the program includes course work in the student's area of emphasis, as well as methods courses, breadth requirements, and research experience under the supervision of a faculty mentor. Training and experience in college-level teaching is an important part of the program, and students also receive training and experience in grant writing. Student support is available through teaching assistantships, research assistantships, and teaching stipends.

Admissions Requirements

The Department of Psychology graduate programs are open to qualified graduates of universities and colleges of recognized standing. Applications are due by January 15 in order to receive full consideration for admission in the upcoming academic year.

Financial Assistance

Students are routinely supported through research and teaching assistantships. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. All students who submit complete applications to the program by the appropriate deadlines are considered for assistantships. There is not a separate application for financial aid. Doctoral students are eligible for university fellowships that are awarded on a competitive basis.

Master's Program

In consultation with the adviser and student's supervisory committee a Plan of Study would be developed. The Master of Science in Psychology program requires the completion of 30 credit hours of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher.

Doctoral Program

1. Complete a master's degree in Psychology. This may be done at NDSU or elsewhere.
2. Complete at least 90 hours of graduate credit, including those completed for the master's degree;
3. 60 or more of these credits must be earned at NDSU. At least 31 credit hours must be in approved didactic courses, and at least 15 of these must be at the 700 level.
4. Complete quantitative and research methods courses.

Code	Title	Credits
PSYC 640 & PSYC 762	Experimental Methods and Advanced Research Methods and Analysis	6
PSYC 761	Applied Research Methods	3

5. Complete core courses in each program area:

Code	Title	Credits
Health & Social Psychology		
PSYC 771	Social/Health Psychology Research	3
PSYC 787	Advanced Social Psychology and Health	3
Visual & Cognitive Neuroscience:		
PSYC 720	Advanced Topics in Cognitive Neuroscience	
PSYC 731	Fundamental Processes in Cognition	

6. Complete four credits of didactic electives at the graduate level (600-level or above) from inside or outside the Psychology department.
7. Complete PSYC 790 Graduate Seminar (graduate seminar and colloquium series) each semester.
8. Participate in a continued program of research apprenticeship with at least one faculty member and, accordingly, enroll in PSYC 793 Individual Study/Tutorial each semester for 1-5 credits.
9. Complete one didactic course in college teaching. Choose from either COMM 702 Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 Teaching College Science.
10. After completion of the teaching course described in #9, teach one undergraduate course under the supervision of a faculty mentor. In the semester you teach your first course enroll in 5 credits of PSYC 892 Graduate Teaching Experience.
11. Complete one didactic course in grant writing in psychology (PSYC 763 Grant Writing for Psychological Scientists - **new course submitted for approval 12/2018)
12. Prepare and submit a research grant or fellowship application under the supervision of a faculty mentor. Register for 1-3 credits of PSYC 893 - Grant Writing Experience - **new course proposed 12/2018) during the semester you prepare and submit your application. Proposals may be submitted to any sponsor requesting funds for tuition/stipend, research supplies, or other research expenses (e.g., participant payment, software, consultants). There is no minimum amount of funding request required, and the proposal must be submitted but need not be funded.
13. Complete a major area paper to serve as the comprehensive exam for Ph.D. candidacy. The area paper will be a comprehensive literature review of the student's area of research and will include an oral defense.
14. Complete the dissertation. The student will defend a written proposal before a faculty committee, conduct an original research project, and complete a comprehensive written report on the project. The student will complete a final oral defense before the same committee.

Benjamin J. Balas, Ph.D.

Massachusetts Institute of Technology, 2007
Field: Brain and Cognitive Sciences

Barbara Blakeslee, Ph.D.

University of California, Santa Barbara, 1983
Field: Biopsychology, Vision Science

Martin D. Coleman, Ph.D.

University of Sussex, 2005
Field: Emotion and Decision Making

Erin Conwell, Ph.D.

Brown University, 2009
Field: Cognitive and Linguistic Sciences

Katherine Duggan, Ph.D.

University of California, Riverside, 2016
Field: Social-Personality and Health Psychology

Jeremy Hamm, Ph.D.

University of Manitoba, 2016
Field: Health and Social Psychology or Developmental Psychology

Clayton J. Hilmert, Ph.D.

University of California, San Diego, 2003
Field: Health and Social Psychology; Stress Psychophysiology, Cardiovascular Health, and Pregnancy

Verlin B. Hinsz, Ph.D.

University of Illinois, 1983

Field: Social and Industrial/Organizational; Small Group Performance, Group Decision Making

Leah Irish, Ph.D.

Kent State University, 2011

Field: Health and Social Psychology, Health Behaviors, Sleep, Stress

Jeffrey S. Johnson, Ph.D.

University of Iowa, 2008

Field: Visual Cognitive Neuroscience

Linda Langley, Ph.D.

University of Minnesota, 1998

Field: Cognitive Neuroscience, Cognitive Aging, Attention

Mark E. McCourt, Ph.D.

University of California, Santa Barbara, 1982

Field: Biopsychology, Vision Science; Visual Psychophysics, Neuropsychology

Mark Nawrot, Ph.D.

Vanderbilt University, 1991

Field: Visual Neuroscience; Neural Mechanisms for Perception of Depth and Motion, Eye Movements, Alcohol

Michael D. Robinson, Ph.D.

University of California, Davis, 1996

Field: Social/Personality Affective Processes

Laura E. Thomas, Ph. D.

University of Illinois, 2008

Field: Embodied cognition, Links between action, perception, and cognition

Kathryn Wissman, Ph.D.

Kent State University, 2016

Field: Cognitive Psychology

Adjunct

Terence W. Barrett, Ph.D.

University of North Dakota, 1989

Field: Counseling; Issues in Therapy, Forensic Psychology

Scott G. Engel, Ph.D.

North Dakota State University, 2003

Field: Health and Social Psychology; Obesity and Eating Disorders

Holly Hegstad, Ph.D.

University of North Dakota, 1999

Field: Clinical Psychology; Anxiety and Mood Disorders

Jennifer A. Redlin, M.S.

North Dakota State University, 1999

Field: Clinical and Behavioral Psychology

Public Health

Department Information

- **Department Chair:**
Pamela Jo Johnson, MPH, PhD, FACE
- **Department Location:**
Aldevron Tower 6th Floor
- **Department Phone:**
(701) 231-6269

- **Department Web Site:**
www.ndsu.edu/publichealth/ (<http://www.ndsu.edu/publichealth/>)
- **Application Deadline:**
Early review begins November 15th rolling through May 31 or until full.
- **Credential Offered:**
MPH
- **Test Requirement:**
The GRE requirement is waived for the current admissions cycle.
- **English Proficiency Requirements:**
TOEFL iBT 90; IELTS 6.5

Program Description

Public health promotes and protects the health of people and the communities where they live, learn, work and play. It is both an art and a science and is practiced by multidisciplinary teams of professionals whose training spans a wide array of social, biological, and clinical sciences. Public health professionals conduct research to identify the causes of disease and disability, address social determinants of health through programs and policy, monitor the spread of disease, promote healthy lifestyles through education and community engagement, and implement clinical practice or health and social policy change.

Our program offers specializations in community health sciences and epidemiology as well as focused courses in management of infectious diseases and American Indian public health. The Master of Public Health (MPH) in Epidemiology is a science, technology, engineering, or mathematics (STEM) degree. This designated degree qualifies for purposes of the 24-month STEM optional practical training (OPT) extension.

The MPH degree consists of 42 credits and can be completed in two years as a full-time graduate student. In addition, there are options for accelerated bachelor's to master's plans of study as well as dual degree options. A variety of Graduate Certificates are also available.

All applicants to the Master of Public Health program must demonstrate adequate preparation in a field related to public health and show potential to undertake advanced study, research and practical training as evidenced by previous academic accomplishment and experience.

All admission decisions are based upon full review of all information in the application in order to ensure fairness and to balance the limitations of any single element of the application, including practical experience in the field of public health.

Minimum Program Admission Requirements

1. Completion of the online application form and payment of the application fee.
2. A baccalaureate degree or equivalent from an accredited college or university (for U.S. degrees, accreditation by one of the six regional accrediting associations: MSA, NASC, NCA, NEASC-CIHE, SACS-CC or WACS-Sr.).
3. An undergraduate and graduate (if applicable) cumulative grade point average (GPA) of at least 3.00. Undergraduate coursework in fields related to public health should generally exceed a GPA of 3.00.
4. **The GRE requirement is waived for the current admissions cycle, however, you are still welcome to submit an exam score if you choose.**

Your success as a Graduate Student at NDSU is important and so we require a standardized test score to be submitted.* The Graduate Record Examination (GRE) General Test, Medical College Admission Test (MCAT), Graduate Management Admission Test (GMAT), Dental Admission Test (DAT), Law School Admission Test (LSAT), Pharmacy College Admission Test (PCAT), and United States Medical Licensing Examination (USMLE) are accepted. While there is no minimum score required for admission on standardized tests, performance is used as an indicator of an applicant's verbal and quantitative skills.

**A standardized test is not required of applicants who have completed a degree in a graduate program at an accredited U.S. or Canadian institution of higher learning that required a standardized test score for admission. This test is also waived if applicants can show a minimum of five years of work experience, preferably in a community health-related field post baccalaureate degree along with a GPA of 3.2 or higher from most recent degree earned. Please email a current CV/resume and unofficial transcript to Stefanie.meyer@ndsu.edu, if you'd like to be considered for a waiver.*

5. All graduate applicants must demonstrate academic-level proficiency with the English language before they will be considered for admission. This requirement must be met by all applicants, regardless of citizenship, residency, or nation of birth. No applicants will be considered for admission until the English Language Proficiency Requirement has been met. The English Proficiency Requirement will not be waived for any reason. This requirement may be satisfied in any of the following ways:
 - A bachelor's degree or higher from a recognized institution in the United States, England, Scotland, Ireland, Wales, Jamaica, Australia, New Zealand, or English Speaking Canada;
 - An overall minimum band score of 6.5 on the Academic Module IELTS;

- A satisfactory score on the Test of English as a Foreign Language (TOEFL). The expected minimum score is 233 for the computer-based test, 90 for the Internet-based test, and 577 for the paper-based test.
- Successful completion of English Language Service (ELS) Language Center's Intensive Level 112.

6. Applicants are required to submit the following supporting documentation

- Written Statement of Purpose and Goals – applicants must submit a one-page, written narrative describing their education, relevant work experience and current professional career goals. Applicants are expected to comment on plans they have to use their education and training in public health and any personal qualities, characteristics and abilities they believe will enable them to be successful in achieving their professional career goals.
- Resume or Curriculum Vitae (CV)
- Official post-secondary academic transcripts from all institutions attended (transcripts must be sent directly from the institutions to NDSU)
- Admissions Tests – scores must be sent by the Educational Testing Service (ETS) directly to NDSU. The institution code for the GRE and TOEFL the institution code for North Dakota State University is **6474** and Centralized Application Service for Public Health Programs (SOPHAS) Code **4770**.
- Three (3) letters of recommendation from individuals who the applicant feels are most qualified to evaluate their academic achievement; clinical, public health or other professional experiences; or leadership potential in public health.

The Admissions Committee may invite selected applicants for an interview on the basis of the Committee's review of all submitted application materials.

Early review begins November 15th, rolling through March 1 or until the class cohort is full.

Code	Title	Credits
Required Coursework		
PH 704	Public Health Management and Policy	3
PH 731	Biostatistics	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 712	Public Health Research Methods	3
PH 745	Community Health Leadership	3
PH 706	Essentials of Epidemiology	3
PH 720	Environmental Health	2
PH 794	Practicum	3
PH 789	Integrative Learning Experience (Integrative Learning Experience)	1
Specialization Courses (select from below)		18
Total Credits		42

Epidemiology Option

Code	Title	Credits
PH 750	Epidemiologic Methods I	2
PH 752	Epidemiologic Methods II	2
PH 753	Public Health Surveillance	2
PH 754	Health Survey Research	2
Select One Group from below for 10 credits:		10
Group One: Management of Infectious Diseases		
PH 735	Principles of Infectious Disease Management I	
PH 736	Principles of Infectious Disease Management II	
Electives (4 credits)		
Group Two: American Indian Public Health		
PH 772	American Indian Health Equity	
PH 774	Research and Evaluation in Tribal Communities	
Electives (4 credits)		
Group Three: Electives (10 credits)		
Total Credits		18

Community Health Sciences OPTION

Code	Title	Credits
PH 700	Preventing and Managing Chronic Illness	3
PH 725	Promoting Health through Policy, System and Environment	3
PH 711	Integrating Primary Care and Public Health	3
PH 722	Applied Community Health	3
Select One Group from below for 6 credits:		6
Group One: Electives (6 credits)		
Group Two: American Indian Public Health		
PH 772	American Indian Health Equity	
PH 774	Research and Evaluation in Tribal Communities	
Total Credits		18

Students cannot receive credit for past work experience.

For more information about MPH options, please visit the website (https://www.ndsu.edu/publichealth/degrees_and_programs/degree_specializations/).

Code	Title	Credits
American Indian Public Health		
PH 704	Public Health Management and Policy	3
PH 772	American Indian Health Equity	3
PH 774	Research and Evaluation in Tribal Communities	3
Total Credits		9

Code	Title	Credits
General Public Health		
PH 704	Public Health Management and Policy	3
PH 741	Social and Behavioral Sciences in Public Health	3
PH 706	Essentials of Epidemiology	3
PH 745	Community Health Leadership	3
Total Credits		12

Code	Title	Credits
Infection Prevention		
PH 704	Public Health Management and Policy	3
PH 735	Principles of Infectious Disease Management I	3
PH 736	Principles of Infectious Disease Management II	3
PH 706	Essentials of Epidemiology	3
Total Credits		12

Faculty

Andrea Huseth, PhD

Leslie Laam, PhD

Mark Strand, PhD, CPH

Mary Larson, PhD, MPH, RD, CDE, CHES

Pamela Jo Johnson, MPH, PhD, FACE

Paul Carson, MD, FACP

Ramona Danielson, PhD

Rick Jansen, PhD

Stefanie Meyer, PhD, CSCS

Tracy Miller, PhD, MPH

Publishing

The Graduate Certificate in Publishing offers students in-depth real-world experience with an established publishing house, NDSU Press. Established in 1950, the NDSU Press publishes peer-reviewed manuscripts in any field of learning that contribute to scholarly knowledge of the region or public consciousness of the region.

Students in the Publishing Certificate program gain hands-on experience in publishing scholarly and literary works. Students learn about product planning and design, editing, marketing, author relations, business and copyright law, publishing industry operations, contracting and purchasing, electronic publishing and marketing, and professional standards and ethics.

The Certificate in Publishing is available to currently enrolled graduate students at NDSU and to individuals who are not current students.

Applicants must write a statement (approximately 500 words) explaining their interest in the certificate program. In the statement of purpose, applicants are encouraged to describe any relevant academic or professional experiences.

The Publishing Certificate program admits students in the fall and spring semesters.

The nine-credit certificate program consists of three required 3-credit courses.

Code	Title	Credits
AHSS 672	Introduction to Publishing	3
AHSS 676	Practicum in Publishing	3
AHSS 695	Field Experience	3
Total Credits		9

Range Science

Department Information

- **Director, School of Natural Resource Sciences:**
Frank Casey, Ph.D.
- **Program Leader:**
Torre Hovick, Ph.D.
- **Department Location:**
School of Natural Resource Sciences, Hultz 202
- **Department Phone:**
(701) 231-5368
- **Department Web Site:**
www.ndsu.edu/snrs/degrees/graduate_degrees/ (http://www.ndsu.edu/snrs/degrees/graduate_degrees/)
- **Application Deadline:**
International applications are due May 1 for fall semester and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.
- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Range Science program in the School of Natural Resource Sciences offers graduate study leading to M.S. and Ph.D. degrees. Advanced work may involve specialized training in the following areas: rangeland ecology, fire ecology, plant community dynamics, restoration of ecosystem services, ecosystem reclamation, and wildlife population dynamics in rangelands.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to range science programs are fostered.

The Range Science graduate program is open to all qualified graduates of universities and colleges of recognized standing that meet the Graduate School requirements (p. 975).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, three letters of reference, and a TOEFL score for international applicants must be submitted to the Graduate School no later than April 15.

Each student must choose an adviser, usually based upon area of academic and research interest, within the first program year. By the end of the first year of residence, the student must have selected an advisory/supervisory committee and have an approved graduate plan of study, including a research proposal. The advisory/supervisory committee advises the student and administers the graduate exams to the student. Students are referred to the Range Science Graduate Student Handbook for information regarding additional requirements.

Master of Science Program

The range science program has two options for the M.S. degree: the thesis option and the comprehensive study option. The M.S. program requires completion of 30 semester credits of approved graduate and letter-graded course work with an overall GPA of 3.0 or better. The M.S. candidates are required to take an oral examination which covers both the research and academic subject matter covered in their program.

Candidates for the M.S. normally complete their degree requirements in two years.

Code	Title	Credits
Plan A - Thesis Option		30
Didactic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		16
Additional Credits		2
RNG 798	Master's Thesis	6-10

Code	Title	Credits
Plan B - Comprehensive Study Option		30
Didactic Courses (numbered 601-689, 691; 700-789, 791; 800-889, 891)		21
Additional Credits		6-8
RNG 797	Master's Paper	1-3

Doctoral Program

The Ph.D. program requires the completion of 90 semester credits (or the equivalent) of graduate approved and letter graded course work with an overall GPA of 3.0 or better. Candidates for the Ph.D. are required to take a preliminary written and oral examination directed toward the academic subject matter of their chosen discipline and a final defense of a research based thesis.

Candidates for the Ph.D. generally complete their degree requirements in three to four years.

Code	Title	Credits
Master's to Ph.D.		60
Didactic coursework (numbered 601-689, 691; 700-789, 791; 800-889, 891)		15
Additional courses		30-44
RNG 899	Doctoral Dissertation	1-15

Code	Title	Credits
Bachelor's to Ph.D.		90
Didactic coursework (numbered 601-689, 691; 700-789, 791; 800-889, 891)		27
15 of these credits must be at the 700 or 800 level		
Additional courses		48-62
RNG 899	Doctoral Dissertation	1-15

Torre J. Hovick, Ph.D.

Oklahoma State University, 2014

Research Interests: Global change, Avian Ecology, Fire Ecology, Rangeland Management

Ryan F. Limb, Ph.D.

Oklahoma State University, 2008

Research Interests: Fire Ecology, Plant Community Ecology, Grassland Disturbance & Restoration Ecology, Invasive Species Ecology & Management

Kevin K. Sedivec, Ph.D.

North Dakota State University, 1994

Research Interests: Plant Community Ecology, Grazing and Wildlife Interaction, Reclamation of Energy Developed Lands, Range Nutrition, Range Monitoring

Adjunct Faculty

Benjamin Geaumont, Ph.D.

North Dakota State University, 2009

Hettinger Research and Extension Center

Research Area/Activity: Interactions Between Agriculture, Wildlife, and the Environment

John Hendrickson, Ph.D.

Texas A&M University, 1996

USDA, Mandan, ND

Research Area/Activity: Rangeland Ecology and Management

Devan A. McGranahan, Ph.D.

Iowa State University, 2011

Research Interests: Fire behavior and ecology, plant community ecology, fire and grazing management, and effects of global environmental change in rangeland ecosystems worldwide

Chris Schauer, Ph.D.

Oregon State University, 2003

Hettinger Research Extension Center

Research Area/Activity: Nutritional Management of Grazing Livestock

Lance Vermeire, Ph.D.

Texas Tech University, 2002

USDA-ARS Fort Keogh, Miles City, MT

Research Area/Activity: Grazing Ecology, Prescribed Fire, Drought Effects on Rangelands

Rhetoric, Writing and Culture

Department Information

- **Department Chair:**
Stephenson Beck, Ph.D.
- **Graduate Coordinator:**
Adam Goldwyn, Ph.D.
- **Department Location:**
318 Minard Hall
- **Department Phone:**
(701) 231-7143
- **Department Web Site:**
www.ndsu.edu/english/graduate_programs/phd_degree/ (http://www.ndsu.edu/english/graduate_programs/phd_degree/)
- **Application Deadline:**
February 1
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL ibt 100; IELTS 7

The Rhetoric, Writing and Culture Ph.D. degree program is open to all qualified graduates of universities and colleges of recognized standing. The Ph.D. in Rhetoric, Writing and Culture provides students with employable skills in the area of professional and technical communication. This innovative and regionally unique program invites students to work at the intersection of rhetorical, textual, and cultural studies. The number of positions available in technical communication significantly surpasses the number of new Ph.D.s produced each year by a sizable margin. Graduates from NDSU's program may pursue careers as:

- professors in universities or colleges;
- training and development specialists, user-experience experts, and human-computer interaction specialists in industry;
- technical, scientific, or professional writers and editors in research and development organizations, high-tech companies, non-profit organizations, or government agencies.

Hands-on experience is essential to our program. The Rhetoric, Writing and Culture Ph.D. requires six credits of experiential learning. Students can work with professors or mentors in disciplinary writing. Others opt to intern for non-profits or local industries.

NDSU offers opportunities for students in the Ph.D. program to teach discipline-specific writing, such as writing in the sciences, writing for engineers, and writing in business and finance. Ph.D. students are eligible for Presidential Doctoral Graduate Fellowships.

To be admitted with full status to the program, the applicant must fulfill all of the requirements set out below.

- In most cases, applicants are expected to have completed a Master of Arts or Science, but exceptional candidates may be admitted directly out of the Bachelor's degree
- Have completed a BA, BS, MA, or MS from an accredited educational institution.
- Have a minimum cumulative grade point average (GPA) of 3.5.

Conditional admission may be granted to students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but demonstrate potential for graduate study. Such students may be required to take additional courses to address deficiencies in prerequisite course work.

In addition to the Graduate School required materials, applications must include:

- an academic writing sample, not to exceed 20 pages, that reflects the student's academic or professional interests and that demonstrates the student's critical and analytical abilities
- A statement of purpose that includes the following:
 - coursework you plan to complete in the program
 - faculty members with whom you wish to study
 - research you plan to pursue
 - a sense of what you hope to do once you have completed a Ph.D. degree in English
 - how your education and/or life experience have prepared you for graduate work
- official transcripts from all previous undergraduate and graduate institutions
- a letter stating your interest in and qualifications for a teaching assistantship.

Financial Assistance

Teaching assistantships are available and awarded based on the applicant's scholastic record and letters of recommendation. Students need to apply to the Graduate School to be considered for admission in the Department of English and before they are eligible for an assistantship. Letters of interest for teaching assistantships, detailing prior experience (if applicable) and qualifications, need to be submitted as part of the application to the program.

Teaching assistantships are reviewed and renewed annually based on academic and professional performance, as well as funding. The annual stipend is \$14,000, which is in addition to tuition waivers (including summer) for the duration of the degree program; TAs are responsible for books and fees. In rare cases, teaching fellowships may be granted to advanced doctoral students who have passed their comp exams and completed their course work. Scholarships (<https://www.ndsu.edu/english/opportunities/>) are available through the Department, the College, the Graduate School, and the University.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits taken beyond the M.A. and at NDSU.

- Students must take a minimum of 30 credits at the 700- or 800-level.
- English 764: Teaching Strategies is required of all Graduate Teaching Assistants who have not taken a similar class elsewhere.
- Students must take 48 of 60 credits at NDSU from within the Department of English.
- Students with a master's degree in another discipline may be required to complete additional graduate course work in specific areas of English, as specified by their adviser and supervisory committee.
- No more than 10 credits may be transferred into the program.

Anastassiya Andrianova, Ph.D.

City University of New York, 2011

Field: British Romantic and Victorian Literature, Drama, Translation, Pedagogy, Postcolonial Literature, Slavic Literature, Animal Studies

Lisa R. Arnold, Ph.D.

University of Louisville, 2011

Field: Rhetoric and Composition, Writing Program Administration, History of Writing Instruction

Sean Burt, Ph.D.

Duke University, 2009

Field: Ancient Jewish Literature, Genre Theory, Ancient Hebrew Poetry, Poetics, Horror Literature & Theory

Adam Goldwyn, Ph.D.

City University of New York, 2010

Field: Medieval Studies, Medieval Greek World, Influence of Ancient Greek Culture in the Middle Ages

Amy Gore, Ph.D.

University of New Mexico, 2019

Field: Early Indigenous and American literatures, Book history, Gothic literature, Body studies, and the Recovery of marginalized women and Native American writers

Alison Graham-Bertolini, Ph.D.

Louisiana State University, 2009

Field: Contemporary American Literature, Literature of the Southern United States, Women's Literature, Contemporary Ethnic and Postcolonial Literature

Linda L. Helstern, Ph.D., Emerita

Southern Illinois University-Carbondale, 2001

Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

Daniel Kenzie, Ph.D., Affiliated Faculty

Purdue University, 2017

Rhetoric & Composition, Professional & Technical Writing, Rhetoric of Health & Medicine, Disability Studies

R.S. Krishnan, Ph.D., Emeritus

University of Nebraska, 1981

Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Bruce Maylath, Ph.D.

University of Minnesota, 1994

Field: International Technical Communication, Rhetoric and Composition, Linguistics

Mary McCall, Ph.D.

Purdue University, 2017

Rhetoric & Composition, Usability & User Experience, Professional & Technical Writing, Writing Across the Curriculum, Women's, Gender, and Sexuality Studies

Robert O'Connor, Ph.D., Emeritus

Bowling Green State University, 1979

Field: Romantic Literature, Science Fiction and Fantasy

Kelly Sassi, Ph.D.

University of Michigan, Ann Arbor, 2008

Field: English Education, Composition and Rhetoric, Native American Literatures, Culturally Responsive Pedagogy

Dale Sullivan, Ph.D., Emeritus

Rensselaer Polytechnic Institute, 1988

Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Verena Theile, Ph.D.

Washington State University, Pullman, 2006

Field: 16th/17th Century Literature, Shakespeare, Early Modern Drama, European Literature, Literary Theory, Science Fiction and Fantasy, Film and Adaptation Studies

Emily D. Wicktor, Ph.D.

Kansas, 2010

Field: 19th Century British Literature and Culture, particularly Victorian Sexuality and Sexual History; Rhetoric, Composition, and Pedagogy; Literary Theory; Modern British and American Drama; Research Methods and Methodology

Sociology

Department Information

- **Department Chair:**
Christina Weber, Ph.D.
- **Graduate Coordinator:**
Kristen Fellows, Ph.D.
- **Department Location:**
Minard 428
- **Department Phone:**
(701) 231-8657
- **Department Email:**
ndsu.soc.anth@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/socanth (<http://www.ndsu.edu/socanth/>)
- **Application Deadline:**
For full consideration, applications must be received by February 15 for fall semester and September 15 for spring semester
- **Credential Offered:**
M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Sociology and Anthropology offers the M.S. degree in Sociology. This program is based on the principle that graduate level education in Sociology is a desirable preparation for a growing number of career orientations. Sample positions that our graduates have obtained include research analyst, instructor and human service worker. The precise plan of study for each student will be established in consultation with the academic adviser with the student's career goal in mind.

The focus of graduate education in Sociology is directed toward both the development of applied sociologists and the advanced training of those seeking to pursue a doctoral degree. Students may elect to take courses in a specialty area, or they may pursue a background in general sociology. Areas of specialization include medical sociology/gerontology and community development.

The Sociology graduate program provides students with the opportunity to expand their background and perspectives in research methods and theory. Consequently, the first year of the program is designed to expose students to theory and both quantitative and qualitative research methods.

Two program options are available for students. In the thesis option, students work on a research-based thesis. Students typically test theoretical assumptions using primary or secondary data. The comprehensive study option is designed for students who wish to combine their studies with some type of specialized field experience. Students electing this option are required to complete a comprehensive study paper related to their internship, such as evaluating a program.

Students in the Sociology graduate program benefit from a favorable faculty-to-student ratio.

Admissions Requirements

The Department of Sociology and Anthropology graduate program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 975), the applicant must have earned a cumulative grade point average in all courses of at least 3.0 or equivalent and a grade point average of 3.2 or higher in sociology.

Financial Assistance

Teaching assistantships are available to qualified applicants. Research assistantships may also be available, contingent on faculty research funds. Applicants for assistantships are considered on the basis of scholarship and potential to undertake advanced study and research. To be considered for an assistantship, a completed Graduate School application, official transcripts, and three letters of reference must be received by the Graduate School no later than February 15.

Students must complete a minimum of 30 credits and a master's thesis for the thesis option, a minimum of 35 credits and a paper for the comprehensive study option, or a minimum of 35 credits and an exam for the culminating experience. An oral defense of the thesis, the paper, or the exam is required.

Requirements for the M.S. degree in sociology are as follows:

1. Successfully complete

Code	Title	Credits
SOC 723	Social Theory	3
SOC 700	Qualitative Methods	3
SOC 701	Quantitative Methods	3

2. Complete an additional 21 credits (including thesis) or 26 credits (including comprehensive study or culminating experience)

3. Complete a research-based thesis, comprehensive study paper, or comprehensive exam and pass an oral defense of the thesis, paper, or exam administered by the student's supervisory committee.

Pamela Emanuelson, Ph.D.

University of South Carolina, 2008

Research Interests: Small Group Processes, Social Psychology, Mathematical Sociology, Economic Sociology, Sociopolitical Evolution

Dane R. Mataic, Ph.D.

The Pennsylvania State University, 2018

Research interests: Mobilization, International Conflict, Social Inequalities, Sociology of Religion, Organizations

Christina D. Weber, Ph.D.

SUNY–Buffalo, 2005

Research Interests: Social Theory, Feminist Theory, Sociology of Gender, Memory and Trauma Studies, Social Change

Christopher M. Whitsel, Ph.D.

Indiana University, 2009

Research interests: Social Inequality, Research Methods, Global Comparative Sociology, Post-Soviet Central Asia

Lecturers

Patty Corwin, M.A.

North Dakota State University, 1972

Research interests: Minorities and Race Relations, Gender, and Service Learning

Leretta Smith, Ph.D.

South Dakota State University, 2007

Research interests: Family, Education, and Gender

Software Engineering

Department Information

- **Department Chair:**
Simone Ludwig, Ph.D.
- **Program Coordinator:**
Saeed Salem, Ph.D.
- **Department Location:**
258 QBB
- **Department Phone:**
(701) 231-8562
- **Department Email:**

gradinfo@cs.ndsu.edu

- **Department Web Site:**
ndsu.edu/cs/ (<http://ndsu.edu/cs/>)
- **Application Deadline:**
February 1 for fall admission; September 1 for spring admission* No summer admission for any Software Engineering Program
- **Credential Offered:**
Ph.D., M.S., M.S.E, Certificate
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

Software Engineering is focused on the application of systematic, disciplined, and quantifiable approaches to the development, operation, and maintenance of software systems. Inclusive of computer programming but going well beyond, Software Engineering is concerned with methodologies, techniques, and tools to manage the entire software life cycle, including development of requirements, specifications, design, testing, maintenance, and project management. The advent of Software Engineering is a natural result of the continuous quest for software quality and reusability, and the maturing of the software development industry.

The Department of Computer Science offers a Graduate Certificate in Software Engineering, Master of Software Engineering, Master of Science in Software Engineering, and Ph.D. in Software Engineering. The programs are designed to appeal to both full-time students and software professionals who are employed and wish to pursue a program part time. The Master of Software Engineering is a course work only program while the Master of Science in Software Engineering is a course work, comprehensive examination and research program. For additional information, see the Computer Science website (<https://www.ndsu.edu/cs/graduates/>) or contact the Computer Science Department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

**Spring admissions are given only occasionally, depending on funding and faculty interest. If there are no spring openings, spring applicants are automatically considered for the subsequent fall semester.*

In addition to the Graduate School requirements (p. 975), applicants must fulfill the program requirements listed below:

Certificate

1. B.S. or equivalent degree from an educational institution of recognized standing, including 12 semester hours or equivalent of Computer Science or Software Engineering courses from an educational institution of recognized standing, or at least one year full-time professional software engineering experience;
2. Programming skill in a modern higher level programming language, preferably C++, C#, or Java;
3. A 2.85 (on a 4.0 scale) GPA in previous course work.

Master of Software Engineering

1. Bachelor's level (B.S., B.A., Sc.B., etc.) degree from an educational institution of recognized standing;
2. Ability to design and implement a program consisting of several interacting classes that might total approximately 100 executable statements;
3. International Students require a minimum TOEFL iBT of 79 or an IELTS of 6.5.
4. A 3.0 (on a 4.0 scale) GPA in previous coursework. Conditional admission may be given with a 2.7 or higher GPA and professional experience.

Master of Science

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.0 grade point average on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 2 years of full-time professional software engineering experience. Full time professional experience may offset the GPA requirement at the rate of 0.1 in GPA for each 18 months of such experience to a maximum of 0.3 in GPA;
2. Programming skill with one modern higher level programming language, preferably C++, C#, or Java.
3. A 3.0 (on a 4.0 scale) GPA in all previous coursework.

Doctor of Philosophy

1. Four year or longer B.S. or equivalent degree from an educational institution of recognized standing with at least a 3.25 grade point average (GPA) on a 4.0 grade point scale. Eighteen semester hours or equivalent in Computer Science from an educational institution of recognized standing, or at least 3 years of full-time professional software engineering experience. Significant full-time professional software development experience may

offset this GPA requirement at the rate of 0.1 in GPA for each 2 years of such experience to a maximum of 0.4 in GPA. If the applicant has an M.S. or equivalent degree from an educational institution of recognized standing, the GPA in that degree should be at least 3.35 on a 4.0 scale.

2. Programming skill in at least 1 higher level programming language, preferably C++, C#, or Java.

Graduate Certificate

Code	Title	Credits
CSCI 713	Software Development Processes	3
Select two of the following:		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	3
Total Credits		12

Masters of Software Engineering

Code	Title	Credits
Core Courses - 15 Credits		
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 718	Software Testing and Debugging	
CSCI 848	Empirical Methods in Software Engineering	
Electives - 15 Credits		
CSCI 714	Software Project Planning and Estimation	
CSCI 717	Software Construction	
CSCI 724	Survey of Artificial Intelligence	
CSCI 736	Advanced Intelligent Systems	
CSCI 765	Introduction To Database Systems	
CSCI 834	Knowledge Based Systems	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
Total Credits - 30		

Master of Science

Code	Title	Credits
Core Courses		12
CSCI 713	Software Development Processes	
CSCI 715	Software Requirements Definition and Analysis	
or CSCI 718	Software Testing and Debugging	
CSCI 716	Software Design	
CSCI 765	Introduction To Database Systems	
Six credits (not part of the core) from		6
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 717	Software Construction	

CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	3
Plan A: Master's Thesis		
Other Computer Science or Software Engineering Courses		3-6
CSCI 798	Master's Thesis	6-9
Plan B: Master's Paper		
Other Computer Science or Software Engineering Courses		9
CSCI 797	Master's Paper	3
Total Credits		33

Code	Title	Credits
Students seeking an option in cybersecurity must take 9 credits from the below list.		9
CSCI 601		
CSCI 602		
CSCI 603	Defensive Network Security	
CSCI 604	Ethical Hacking	
CSCI 605		
CSCI 606		
CSCI 607		
CSCI 608		
CSCI 609	Cybersecurity Law and Policy	
CSCI 610	Computer Crime and Forensics	
CSCI 669	Network Security	
CSCI 773	Foundations of the Digital Enterprise	

Doctor of Philosophy

Bachelor's to Doctor of Philosophy in Software Engineering degree requirements

Code	Title	Credits
Select 5 from the courses listed below:		15
CSCI 713	Software Development Processes	
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	3
Courses in Software Engineering approved by the student's Supervisory Committee.		21-36
CSCI 899	Doctoral Dissertation	36-51
Total Credits		90

Master's to Doctor of Philosophy in Software Engineering degree requirements

Code	Title	Credits
Select 5 from the courses listed below		15
CSCI 713	Software Development Processes	
CSCI 714	Software Project Planning and Estimation	
CSCI 715	Software Requirements Definition and Analysis	
CSCI 716	Software Design	
CSCI 717	Software Construction	
CSCI 718	Software Testing and Debugging	
CSCI 845	Formal Methods for Software Development	
CSCI 846	Development of Distributed Systems	
CSCI 847	Software Complexity Metrics	
CSCI 848	Empirical Methods in Software Engineering	
CSCI 790	Graduate Seminar	3
Courses in Software Engineering approved by the student's Supervisory Committee.		6-12
CSCI 899	Doctoral Dissertation	30-36
Total Credits		60

Students seeking an option in cybersecurity must take 9 credits from the below list.

Code	Title	Credits
Courses numbered CSCI 601-610		
and		
CSCI 669	Network Security	
CSCI 773	Foundations of the Digital Enterprise	

- A minimum of 15 didactic credits numbered 700-789 and/or 800-898.
- Students who applied the listed core courses towards a MS degree obtained from NDSU can take up to 42 research credits.
- Research adviser should be selected by the second semester at NDSU.
- A Plan of Study listing coursework and examination committee members should be completed by the end of the second semester at NDSU.
- Satisfactory completion of the Comprehensive Exam at the PhD level (written exam based on the core courses).
- Research proposal presentation and preliminary oral examination (Qualifying Exam) should be completed by the fourth semester at NDSU after passing the Comprehensive Exam.
- Final Oral Examination on the PhD dissertation.

Zahid Anwar, Ph.D.

University of Illinois at Urbana-Champaign, 2008

Research Interests: Cybersecurity Policy and Law, Artificial Intelligence and Machine Learning

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Jun Kong, Ph.D.

University of Texas, Dallas, 2005

Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Pratap Kotala, Ph.D.

North Dakota State University, 2015

Research Interests: Software Engineering

Juan (Jen) Li, Ph.D.

University of British Columbia, 2008

Research Interests: Smart and Connected Health, Semantic Web Technologies, Internet of Things (IoT)

Lu Liu, Ph.D.

University of Texas San Antonio, 2017

Research Interests: Bioinformatics, Data Mining, Machine Learning, Data Science

Simone Ludwig, Ph.D.

Brunel University, 2004

Research Interests: Swarm Intelligence, Evolutionary Computation, Deep Neural Networks, Fuzzy Reasoning, Machine Learning

Kenneth Magel, Ph.D.

Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

M. Zubair Malik, Ph.D.

University of Texas at Austin, 2014

Research Interests: Program Analysis, Automated Program Repair, Secure Software Development, Software Verification-Validation and Testing, Software Systems (especially large scale Distributed Systems for Data science and Machine Learning), Formal Methods, Application of Artificial Intelligence in Program Analysis

Oksana Myronovych, Ph.D.

North Dakota State University, 2009

Research Interests: Software Engineering

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009

Research Interests: Bioinformatics, Machine Learning and Data Mining

Jeremy Straub, Ph.D.

University of North Dakota, 2015

Research Interests: Multi-tier Mission Architecture & Control, Autonomous Data Link Reduction, Autonomous Vehicle Control, Machine Vision, Super Resolution

Vasant Ubhaya, Ph.D.

University of California-Berkeley, 1971

Research Interests: Algorithm Analysis, Approximation and Optimization

Changhui Yan, Ph.D.

Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Affiliate Faculty

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978

Research Interests: Data Science, Optimization, Cybersecurity, Smart Grid, Sensor Networks, Agents, Simulation, Artificial Intelligence, Adaptive Systems, Swarm Intelligence

Gursimran Walia, Ph.D.

Mississippi State University, 2009

Otto Borchert, Ph.D.

North Dakota State University, 2015

Research Interests: Artificial Intelligence, Educational Games, STEM Learning

Soil Science

Department Information

- **Director, School of Natural Resource Sciences:**

Frank Casey, Ph.D.

- **Program Leader:**

Thomas DeSutter, Ph.D.

- **Email:**

Thomas.DeSutter@ndsu.edu

- **Department Location:**

School of Natural Resource Sciences, Hultz 202

- **Department Phone:**

(701) 231-5368

- **Department Web Site:**

www.ndsu.edu/snrs/degrees/graduate_degrees/ (http://www.ndsu.edu/snrs/degrees/graduate_degrees/)

- **Application Deadline:**

International applications are due May 1st for fall and August 1 for spring and summer semesters. Domestic applicants should apply at least one month prior to the start of classes.

- **Credential Offered:**
Ph.D., M.S.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Soil Science in the School of Natural Resource Sciences offers graduate study leading to the M.S. and Ph.D. degrees that provide training in agricultural and/or environmental career tracks. The instructional research programs emphasize an understanding of soil-plant-atmosphere interactions and their application to soil and water resource management. Students may pursue degrees with emphasis in soil chemistry, soil fertility, soil ecology, soil physics, soil reclamation, soil genesis and morphology, soil management and conservation, environmental modeling, water quality, and soil salinity and sodicity. M.S. and Ph.D. programs in Natural Resources Management and Environmental and Conservation Science with emphasis in soil science are also available.

A close working relationship exists between the department and various state and federal agencies and the private sector. Strong supporting course work is available from other departments and programs at North Dakota State University. Programs of study are designed to meet student interests and needs.

North Dakota's diversity of soils and agricultural practices provides an exceptional field setting in which to study soil science. The department is well equipped for field and laboratory investigations.

Admissions Requirements

The Soil Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. All applicants must meet the Graduate School requirements (p. 975).

Financial Assistance

Research assistantships are available. Applicants are considered on the basis of scholarship, potential to undertake advanced study and research, and financial need. To be considered for an assistantship, applicants must submit a completed application. A complete application will include three recommendations, transcripts and a scholarly writing example. A TOEFL score for international applicants must also be received by the Graduate School.

The M.S. program normally requires 24 months of full-time study and research while the Ph.D. program normally requires a minimum of 36 months. An overall GPA of 3.0 or better must be maintained. An oral defense of thesis and academic subject matter is required of M.S. candidates. Ph.D. candidates are required to take a preliminary written and oral examination of academic subject matter and a final oral defense of a research-based dissertation.

Francis X.M. Casey, Ph.D.

Iowa State University, 2000

Research Area/Activity: Field Oriented Soil Physics, Measurement and Prediction of Water Transfer and Chemical Transport Through Soil

Amitava Chatterjee, Ph.D.

University of Wyoming, 2007

Research Area/Activity: Soil Fertility Management, Greenhouse Gas Emissions

Larry J. Cihacek, Ph.D.

Iowa State University, 1979

Research Area/Activity: Erosion and Productivity Relationships, Conventional and Alternative Crop Management, Carbon Sequestration, Nutrient Management

Thomas M. DeSutter, Ph.D.

Kansas State University, 2004

Research Area/Activity: Trace Elements, Land Application of Byproducts, Inorganic Soil Chemistry, Soil Environmental Conditions

David W. Franzen, Ph.D.

University of Illinois, 1993

Research Area/Activity: Soil Fertility/State Soil Specialist

Caley Gasch, Ph.D.

University of Wyoming, 2013

Research Area/Activity: Soil Ecology, Restoration, Reclamation, Monitoring of Degraded Soils

R. Jay Goos, Ph.D.

Colorado State University, 1980

Research Area/Activity: Soil Fertility and Management/Fertilizer Management for Small Grains

David G. Hopkins, Ph.D.

North Dakota State University, 1997

Research Area/Activity: Interactions Among Landscape, Soil Morphology, Soil Properties and Environmental Aspects of Land Use

Abbey Wick, Ph.D.

University of Wyoming, 2007

Research Area/Activity: Soil Health in Agricultural and Range Lands; Mine Reclamation

Adjunct Faculty

Allan W. Cattanach, Ph.D.

University of Minnesota, 1979

Research Area/Activity: Soil Fertility, Sugarbeet Management

Gary H. Halvorson, Ph.D.

Oregon State University, 1979

Director of Agriculture, Sitting Bull College, Fort Yates, SD

Mark Liebig, Ph.D.

University of Nebraska, 1998

USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND

Research Area/Activity: Soil Quality, Soil Carbon Dynamics, Greenhouse Gas Flux, Semiarid Agroecosystems

Stephen D. Merrill, Ph.D.

University of California, Riverside, 1976

USDA-ARS Northern Great Plains Research Laboratory, Mandan, N.D.

Research Area/Activity: Soil Erosion Processes; Crop Root Growth and Soil/Crop Hydrology; Mined Land Reclamation

Jill Motschenbacher, Ph.D.

University of Arkansas, 2012

North Dakota State University, Fargo, ND

Research Area/Activity: Soil Physics, Sustainable Cropping Systems

Peter L. O'Brien, Ph.D.

North Dakota State University, 2017

Research Area/Activity: Reclamation, Cover Crops, Soils Management

Laura F. Overstreet Gentry, Ph.D.

North Carolina State University, 2005

Assistant Professor, University of Illinois Urbana-Champaign

Research Area/Activity: Soil Fertility, Grain Crops, Bioenergy Crops, Crop Management, Environmental Systems

Jimmie L. Richardson Ph.D.

Iowa State University, 1974

Research Area/Activity: Soil Salinization, Soil Development in Wetlands, Hydrologic Patterns, Sedimentation

James A. Staricka, Ph.D.

University of Minnesota, 1990

Williston Research Extension Center,

Research Area/Activity: Soil and Water Conservation and Nutrient Use Efficiency in Dryland and Irrigated Crop Production

Donald L. Tanaka, Ph.D.

University of Nebraska, 1980

USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND

Research Area/Activity: Dryland Integrated Agricultural Systems, Soil and Crop Ecological Interactions

Statistics

Department Information

- **Department Chair:**
Rhonda Magel, Ph.D.
- **Department Location:**
221 Morrill Hall
- **Department Phone:**
(701) 231-7177
- **Department Email:**
ndsu.stats@ndsu.edu
- **Department Web Site:**
www.ndsu.edu/statistics/ (<http://www.ndsu.edu/statistics/>)
- **Application Deadline:**
Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
- **Credential Offered:**
Ph.D., M.S., Certificate
- **Test Requirement:**
GRE (recommended)
- **English Proficiency Requirements:**
TOEFL iBT 79; IELTS 6.5

Program Description

The Department of Statistics offers programs leading to a Ph.D. in statistics, a M.S. degree in applied statistics. The program is flexible enough to be individually planned around prior experience and in accord with professional goals.

During the first year of the program, master's and doctoral students are strongly encouraged to meet with each faculty member to discuss possible research topics. The student should select an advisory and examining committee by the end of the first year.

A joint master's degree in computer science and statistics may also be obtained. Graduate certificates in Statistics for non-majors and Big Data Applied Statistics Analysis are also available.

Graduate Certificate

- B.S. or equivalent degree from an accredited university,
- Knowledge of College Algebra

Master's Program in Applied Statistics

In addition to the Graduate School requirements (p. 975), the applicant must:

- Have had at least one year of calculus,
- Have had at least one course in statistics, and
- Have had at least one programming language

Joint Master's Program in Computer Science and Statistics

To be admitted with full status into the M.S. program in computer science and statistics, the applicant must satisfy the admission requirements for both the M.S. program in computer science and the M.S. program in applied statistics.

Ph.D. Program in Statistics

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area

Students not holding a master's degree in statistics or a closely related field will not be admitted to the Ph.D. program in statistics. These students must first apply to the M.S. program in applied statistics and complete the M.S. degree.

Ph.D. Program in Statistics (with Emphasis in Sports Statistics)

In addition to the Graduate School requirements, the applicant must:

- Have an M.S. degree in statistics or related area and some knowledge or interest in sports

Financial Assistance

Teaching assistantships are available. To be considered for an assistantship, the application must be complete with the Graduate School no later than March 15.

Statistics Certificate (for non-majors)

The graduate certificate requires 12 semester credit hours consisting of graduate level courses in statistics. STAT 725 needs to be the first course taken for students with little or no prior knowledge of statistics. No credit will be given for STAT 725 for the certificate if it is not the first course taken. Students in the certificate program should not take both STAT 661 and STAT 726. STAT 726 is recommended. Also, students in this program should not take both STAT 670 and STAT 671. After completing the requirements for the certificate, please contact the Department of Statistics to verify completion.

Code	Title	Credits
STAT 670	Statistical SAS Programming	3
STAT 671	Introduction to the R Language	3
STAT 725	Applied Statistics (must be taken first or no credit will be given)	3
STAT 726 or STAT 661	Applied Regression and Analysis of Variance Applied Regression Models	3
Total Credits		12

Big Data Applied Statistics Analysis Certificate

This certificate serves graduate students and working professionals by providing summer online coursework in Big Data Applied Statistics Analysis. Analytics professionals are in demand in this era of big data. Students will learn how to visualize and use statistical learning algorithms to explore big data.

Code	Title	Credits
STAT 712	Applied Statistical Machine Learning	3
STAT 711	Basic Computational Statistics using R	3
STAT 713	Introduction to Data Science	3
STAT 714	Statistical Big Data Visualization	3
Total Credits		12

Master of Science in Applied Statistics

The program for the M.S. degree in applied statistics requires 32 semester credits with an overall GPA of 3.0 or higher. An oral defense of a research-based thesis or paper is required.

Code	Title	Credits
Complete a set of core courses* with a grade of B or better, including		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764 or STAT 774	Multivariate Methods Generalized Linear Models	3
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Successfully complete two 1-credit practicums in consulting. Each statistical practicum will be listed as STAT 794		2
Complete an additional 9-12 hours (depends on number of research hours) of course work selected from the following courses:		9-12
STAT 660	Applied Survey Sampling	
STAT 663	Nonparametric Statistics	
STAT 664	Discrete Data Analysis	
STAT 669	Introduction to Biostatistics	

STAT 670	Statistical SAS Programming
STAT 671	Introduction to the R Language
STAT 672	Time Series
STAT 673	Actuarial Statistical Risk Analysis
STAT 677	Introductory Survival and Risk Analysis I
STAT 678	Introductory Survival and Risk Analysis II
STAT 730	Biostatistics
STAT 732	Introduction to Bioinformatics
STAT 770	Survival Analysis
STAT 775	Using Statistics in Sports
STAT 786	Advanced Inference
STAT 796	Special Topics
STAT 851	Bayesian Statistical Inference
STAT 859	Applied Spatial Statistics
STAT 798	Master's Thesis
or STAT 797	Master's Paper
Must have 15 hours of 700-800 level courses.	

*If one of these courses has been taken at the undergraduate level, another graduate level course should be substituted. STAT 725 Applied Statistics and STAT 726 Applied Regression and Analysis of Variance will not be counted for this degree program.

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 Probability and Mathematical Statistics I and STAT 768 Probability and Mathematical Statistics II. Exam 2 covers STAT 661 Applied Regression Models, STAT 662 Introduction to Experimental Design and STAT 764 Multivariate Methods or STAT 774 Generalized Linear Models. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Complete and successfully defend the research thesis or paper.

M.S. Degree in Computer Science and Statistics

Code	Title	Credits
Statistics Courses		
STAT 661	Applied Regression Models	3
STAT 671	Introduction to the R Language	3
STAT 669	Introduction to Biostatistics	3
STAT 772	Computational Statistics	3
STAT 732	Introduction to Bioinformatics	3
One additional graduate course in statistics, not including STAT 725 Applied Statistics or STAT 726 Applied Regression and Analysis of Variance		
Computer Science Courses		
CSCI 713	Software Development Processes	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 732	Introduction To Bioinformatics	3
CSCI 765	Introduction To Database Systems	3
Two additional graduate level courses in computer science.		
Master's Thesis or Master's Paper Research Credits		
Total Credits		42

Ph.D. Degree in Statistics

The program for the Ph.D. degree requires an additional 30 credits of course work beyond the M.S. degree and 30 hours of research. An oral defense of a dissertation is required. All students entering program must have an M.S. degree in statistics or closely related field. Any core course (or similar

course) required for the M.S. degree that has not been taken before entering the Ph.D. program, must be taken before obtaining the Ph.D. degree. This may require additional course work beyond the 30 credits depending on the area in which the M.S. degree was obtained.

Successfully complete two 1-credit practicums in Consulting/Presentation Practicum. Each statistical practicum will be listed as **STAT 794** Practicum/Internship

Complete at least 30 semester credits of statistics courses at the 600- to 800-level (does not include STAT 725 Applied Statistics STAT 726 Applied Regression and Analysis of Variance). At least 15 credits must be at the 700- to 800-level. Students must take STAT 786 Advanced Inference , STAT 764 Multivariate Methods and STAT 774 Generalized Linear Models if not taken at the M.S. level.

Upon approval by the adviser and advisory committee, up to 9 hours may be taken in Mathematics or Computer Science. It is recommended that a student have knowledge of real analysis at some level such as MATH 650 Real Analysis I .

- A plan of study must be submitted at least one semester prior to graduation.
- Pass a written comprehensive exam. This exam consists of two sections. Exam 1 covers STAT 767 and STAT 768. Exam 2 covers STAT 661, STAT 662 and STAT 764 or STAT 774. Exam 1 is two hours and Exam 2 is three hours. These exams are offered during approximately the fifth week of each semester. A maximum of two attempts is allowed.
- Submit a research proposal and pass an oral exam on the proposal and related topics.
- Complete and successfully defend the research dissertation.

Code	Title	Credits
Core Courses		
STAT 661	Applied Regression Models	3
STAT 662	Introduction to Experimental Design	3
STAT 764 or STAT 774	Multivariate Methods Generalized Linear Models	3
STAT 767	Probability and Mathematical Statistics I	3
STAT 768	Probability and Mathematical Statistics II	3
Additional statistics courses, not including STAT 725 or STAT 726		30
If not taken at the M.S. level, student must take STAT 764, STAT 774, STAT 786.		
STAT 899	Doctoral Dissertation	
Total		60

Ron Degges, Ph.D.

North Dakota State University, 2011
Field: Sampling, Regression Analysis

Seung Won Hyun, Ph.D.

University of Missouri, 2010
Field: Optimal Designs, Adaptive Designs, Clinical Trials

Rhonda Magel, Ph.D.

University of Missouri-Rolla, 1982
Field: Nonparametrics, Inference Under Order Restrictions, Regression

Megan Orr, Ph.D.

Iowa State University, 2012
Field: Biostatistics, Gene Expression Analysis, High-Dimensional Data, Analysis and Multiple Testing

Gang Shen, Ph.D.

Purdue University, 2009
Field: Mathematical Statistics, Asymptotic Theory, Bayesian Analysis, Change-Point Problem

Yarong Yang, Ph.D.

Northern Illinois University, 2010
Field: Machine Learning, Spatial Statistics, Bayesian Statistics, Bioinformatics

STEM Education

Department Information

- **Program Director:**
Jennifer Momsen, Ph.D.
- **Department Web Site:**
www.ndsu.edu/csme/stem_education_graduate_programs/ (http://www.ndsu.edu/csme/stem_education_graduate_programs/)
- **Credential Offered:**
Ph.D. (Dual Major in STEM Education and STEM discipline is an option)
- **English Proficiency Requirements:**
TOEFL iBT 88, IELTS 6.5

Program Description

Applicants are invited for NDSU's interdisciplinary Ph.D. program in Science-Technology-Engineering-Mathematics (STEM) Education. The program conducts and disseminates empirical research to improve STEM learning and teaching in higher education.

Coursework centers on graduate-level courses in the discipline area, a common core of STEM Education courses, and elective courses focused on research training. An interdisciplinary team of faculty supervised the candidate's dissertation research, which will investigate teaching and learning within/across one or more STEM disciplines.

Although interdisciplinary in nature, graduate students in the STEM Education Ph.D. Program have an academic home in the STEM department/program of their discipline preference. Graduate committee membership includes faculty from the STEM Education program and from the department/program of discipline preference.

Applicants will not be considered without a core faculty member who has agreed to serve as the major advisor.

Applicants for the STEM Education PhD program must meet at least one of the following criteria:

- Completed a Masters (or PhD) degree in a STEM discipline.
- Accepted into an NDSU Master's program in a STEM discipline.
- Accepted into an NDSU PhD program in a STEM discipline.

The program requires 60 semester hours beyond the Master's Degree. Additionally, by completion of the doctorate, the coursework must include either a Master's Degree or its equivalent coursework in the chosen STEM discipline (this applies if the Master's Degree is in Education or another related field). In consultation with the student's graduate committee, a plan of study will be developed to ensure that the student has a strong background in

1. discipline-based educational research at the undergraduate level,
2. curriculum, teaching, learning, and assessment, and
3. content expertise within a discipline.

Students enrolled in program must maintain an overall GPA of at least 3.0 both within the content area and STEM courses. If the GPA in either component should drop below 3.0, then the student is placed on academic probation within the program for the following semester. If at the end of that semester the GPA still remains below 3.0, the student is subject to dismissal from the program.

Core Faculty

John Buncher, Physics & STEM Education

Danielle Condry, Microbiology & STEM Education

Warren Christensen, Physics & STEM Education

Mila Kryjevskaja, Physics & STEM Education

Alexey Leontyev, Chemistry & STEM Education

Jennifer Momsen, Biology & STEM Education PhD Program Director

Lisa Montplaisir, Biology & STEM Education

James Nyachwaya, Chemistry, Education, & STEM Education

Katie Wissman, Psychology & STEM Education

Supply Chain Management

Department Information

- **Department Chair:**
Tim Peterson, Ph.D.
- **Academic Coordinator:**
Jody Bohn Baldock
- **Email:**
jody.bohn.baldock@ndsu.edu
- **Department Location:**
Upper Great Plains Transportation Institute, Quentin Burdick Building 418
- **Department Phone:**
(701) 231-7767
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/mscm/ (<http://www.ndsu.edu/business/programs/graduate/mscm/>)
- **Application Deadline:**
July 1 for fall semester; December 1 for spring semester; April 1 for summer semester
- **Credential Offered:**
M.S.C.M., Certificate - All programs offered online only
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics, and Finance offers an online master's degree in Supply Chain Management (MSCM) and an online graduate certificate in Enterprise Resource Planning (ERP). The degree/certificate is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high-quality graduate programs for students. The MSCM and ERP programs take an interdisciplinary approach to transportation and logistics and attracts students with a multitude of backgrounds.

These programs target aspiring supply chain professionals, industry professionals, military officers and Department of Defense civilians who want to meet all the supply chain challenges of the 21st century. A wide range of career opportunities exists in the logistics industry, including supply chain manager, logistics manager, warehouse/distribution manager, business process improvement analyst, and many more.

Curriculum Focus

The uniqueness of the MSCM and ERP programs are reflected in its curriculum focus, which are a direct derivative of the Army's National Logistics Curriculum and private industry needs. The following focus areas define a framework for expected outcomes and curricula:

- supply chain optimization and planning
- international logistics systems
- change management and leadership
- enterprise resource planning including hands-on SAP training and data analytics
- remote sensing and adaptive logistics planning
- transportation analysis and planning for logistics
- emergency management

Master of Supply Chain Management (MSCM)

The MSCM is a non-thesis degree. Students will participate in a multitude of interdisciplinary courses that will enhance and develop their supply chain skills, research abilities, and their capacity to apply them in real world situations.

Certificate in Enterprise Resource Planning (ERP)

SAP is the leading global provider of ERP software. More than 200,000 organizations around the world use SAP software to streamline the management of their business processes. More than 80% of Fortune 1000 companies use SAP to integrate their business activities. To best use their SAP solutions, organizations need people with ERP knowledge and skill to drive business processes effectiveness and efficiency.

The MSCM program offers three courses in SAP that will give you the skills needed to be a leader in the next generation of digital enterprise. These graduate-level courses include up to 50 hours of hands-on experience learning enterprise resource integration of logistic processes such as procurement, material management, production, distribution and fulfillment.

NDSU is a member of the SAP University Alliances which allows our students to learn by having access to SAP data to manipulate and experience real world situations.

Admission Requirements

Both the Master of Supply Chain Management (MSCM) and the Certificate in Enterprise Resource Planning (ERP) are open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent. For those with GPAs of 2.99 or less, the applicant should consider submitting a GMAT/GRE score to be considered for acceptance.
2. Have shown the potential to undertake advanced study as evidenced by prior academic performance and has stated interest in logistics.
3. Submit official transcripts
4. Submit a two-page resume
5. Submit a one-page "Letter of Intent" outlining their reasons for pursuing the degree/certificate
6. Submit three letters of recommendation (NA for certificate option)
7. Submit online application through the NDSU Graduate School website
8. International applicants whose first language is not English and who do not possess a U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL iBT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (<https://bulletin.ndsu.edu/graduate/admission-information/>).

Degree Requirements

Master of Supply Chain Management (MSCM)

A minimum of 30 credits is required for the MSCM and must be completed using the core courses below. An overall GPA of 3.0 or higher must be maintained to remain in good academic standing.

Certificate in Enterprise Resource Planning (ERP)

The certificate in ERP will consist of TL 715, TL 725, and TL 735. More information can be found in the course list below.

Code	Title	Credits
Core Courses (≥ 30 credits)		
TL 711	Supply Chain Systems	3
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	Global Supply Chain Management	3
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 725	ERP Configuration	3
MGMT 727	Organizational Change Management	3
TL 731	Supply Chain Decision Analysis	3
TL 733	Case Studies in Supply Chain	3
TL 735	Practical Data Analytics	3
Total Credits		30

Faculty

Raj Bridgelall, Ph.D.

North Dakota State University, 2015

Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks

Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.

North Dakota State University, 2019

Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks

Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.

Kansas State University, 2012

Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety

Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.

North Dakota State University, 2011

Research Interests: Connected and Autonomous Vehicles, Smart Material and Structure Health Monitoring, Big Data Analytics for Transportation, Smart Transportation, Transportation System, Asset Management, Multimodal Transportation, Geospatial Transportation Modeling

Department: Transportation, Logistics, and Finance

Jeremy Mattson, Ph.D.

North Dakota State University, 2017

Research Interests: Public Transportation, Transportation Economics, Demand Modeling, Travel Behavior, Built Environment

Department: Transportation, Logistics, and Finance

Diomo Motuba, Ph.D.

North Dakota State University, 2009

Research Interests: Transportation and Land Use Planning, Freight Modeling, Transportation Economics, Connected Automated Vehicles, Logistics and Supply Chain Management, Transportation Safety

Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.

Texas A&M University, 1988

Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching

Department: Management and Marketing

Fred Riggins, Ph.D.

Carnegie Mellon University, 1994

Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance

Department: Accounting and Information Systems

Robert Swearingen, Ph.D.

North Dakota State University, 2019

Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management

Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics

Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.

Virginia Polytechnic Institute and State University, 1989

Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis
 Department: Transportation, Logistics, and Finance

Technology Enhanced Curriculum

Department Information

- **Head, School of Education:**
Chris Ray, Ph.D.
- **Graduate Coordinator:**
Nate Wood, Ph.D.
- **Credential Offered:**
Certificate

Transportation and Logistics

Department Information

- **Department Chair:**
Tim Peterson, Ph.D.
- **Academic Coordinator:**
Jody Bohn Baldock
- **Email:**
jody.bohn.baldock@ndsu.edu
- **Department Location:**
Upper Great Plains Transportation Institute, Quentin Burdick Building 418
- **Department Phone:**
(701) 231-7767
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/phd/ (<http://www.ndsu.edu/business/programs/graduate/phd/>)
- **Application Deadline:**
See Admission Requirements
- **Credential Offered:**
Ph.D.
- **English Proficiency Requirements:**
TOEFL iBT 71, IELTS 6

Program Description

The Department of Transportation, Logistics, and Finance offers a Ph.D. degree in Transportation and Logistics (TL). The degree is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high-quality graduate programs for students. The program takes an interdisciplinary approach to transportation and logistics and attracts students with backgrounds in transportation and logistics, agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

Admission Requirements

The Transportation and Logistics Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a master's degree (preferred) from an educational institution of recognized learning, baccalaureate degree a minimum.
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics
3. Have shown the potential to undertake advanced study and research as evidenced by prior academic performance
4. Have earned a cumulative grade point average of at least 3.0 or equivalent in all courses completed at the highest education level reached
5. Submit an NDSU Graduate School application consisting of the application, letter of intent, official transcripts, letters of reference, and English proficiency scores (if applicable). Additional documents that may be submitted could include resume and professional vita. Applications for admission will be submitted via the Graduate School website. Applicants must meet all application requirements of the graduate school and department before being considered for acceptance.

- Domestic applicants requesting funding and all international applicants, the application deadline is April 1 for fall semester and September 1 for spring semester.
- Domestic applicants not requesting funding, the application deadline is July 1 for fall semester and December 1 for spring semester.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (<https://bulletin.ndsu.edu/graduate/admission-information/>).

Financial Assistance

The number of assistantships vary from year to year, depending on grant availability and the number of students in residence. Applicants are considered on the basis of merit and potential to undertake advanced study and research.

To be considered for an assistantship, an applicant must complete a Graduate School application, be accepted by the department, and identify the desire for an assistantship or financial need in the statement of purpose.

Graduate tuition is waived for students with assistantships, but all fees are the student's responsibility.

Degree Requirements

The Ph.D. program requires the completion of a minimum of 90 credits of graduate study beyond the baccalaureate degree. Thirty credits will be automatically considered completed if the student completed one of the Master's degree from the TLF Department. If the student already has a master's degree in a related discipline, the student is eligible to transfer a maximum of 30 credits from the master's degree towards the 90 credits. The credits are required to consist of the following:

- 18 credits of core Transportation & Logistics courses.
- 2 credits of required graduate teaching experience course.
- Out of 10 elective course credits needed, a minimum of 6 credits must be transportation and logistics elective courses.
- A minimum of 30 credits of research-based dissertation credits.

Each student must develop a plan of study under the guidance of a faculty adviser and a supervisory committee. Students must take a total of three different examinations to successfully complete their Ph.D. degree in Transportation and Logistics: 1) the qualifying examination, 2) the proposal defense examination, and 3) the dissertation defense examination. The qualifying examination is a written examination that will be required of each student after the qualifying courses have been completed. After passing the qualifying examination, the student will be formally admitted to candidacy for the Doctor of Philosophy degree. Students who pass the qualifying examination are expected to take the proposal defense examination by the end of their third year in the program. For the proposal defense and dissertation defense examinations, the supervisory committee shall serve as the examining committee and the major advisor shall serve as chair. The proposal defense examination is an oral exam and is concerned primarily with the student's detailed research proposal for the dissertation. Upon completion of the proposal defense examination, a student will be considered a doctoral candidate. The dissertation defense will be taken after the candidate has completed the course work and proposal defense examination. The dissertation defense examination, which is an oral examination, will be concerned primarily with the dissertation; but it may also cover material from course work, especially those courses fundamental to the dissertation. The Ph.D. program requires students to present at least one original transportation and/or logistics research paper at a national or international conference, and submit at least one paper to a referred transportation and/or logistics journal.

Code	Title	Credits
Core Courses (18 credits)		
TL 831	Modeling for Transportation and Logistics Decision Analysis	3
TL 881	Mixed Methods in Transportation Research	3
TL 882	Highway Planning and Logistics	3
TL 883	Introduction to Rail Transportation	3
TL 885	Spatial Analysis in Transportation & Logistics	3
TL 888	Research in Transportation and Logistics	3
Required Courses		
TL 892	Graduate Teaching Experience	2
Transportation and Logistics (TL) Elective Courses (≥ 6 credits)		
TL 811	Modeling for Logistics Research	4
TL 823	Contemporary Supply Chain Research	3

TL 829	Supply Chain Risk Management	3
TL 751	Transportation Cyber-Physical Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3
TL 757	Intelligent Transportation Solutions	
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
TL 715	Introduction to ERP	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	3
TL 725	ERP Configuration	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 733	Case Studies in Logistics	3
TL 735	Practical Data Analytics	3
Dissertation (≥ 30 credits)		
TL 899	Doctoral Dissertation	1-15

Faculty

Raj Bridgelall, Ph.D.

North Dakota State University, 2015

Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks

Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.

North Dakota State University, 2019

Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks

Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.

Kansas State University, 2012

Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety

Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.

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North Dakota State University, 2017

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North Dakota State University, 2009

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Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.

Texas A&M University, 1988

Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching

Department: Management and Marketing

Fred Riggins, Ph.D.

Carnegie Mellon University, 1994

Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance

Department: Accounting and Information Systems

Robert Swearingen, Ph.D.

North Dakota State University, 2019

Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management

Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics

Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.

Virginia Polytechnic Institute and State University, 1989

Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis

Department: Transportation, Logistics, and Finance

Transportation and Urban Systems

Department Information

- **Department Chair:**
Tim Peterson, Ph.D.
- **Academic Coordinator:**
Jody Bohn Baldock
- **Email:**
jody.bohn.baldock@ndsu.edu
- **Department Location:**
Upper Great Plains Transportation Institute, QBB 418
- **Department Phone:**
(701) 231-7767
- **Department Web Site:**
www.ndsu.edu/business/programs/graduate/mtus/ (<http://www.ndsu.edu/business/programs/graduate/mtus/>)
- **Application Deadline:**
July 1 for fall semester; December 1 for spring semester; April 1 for summer semester
- **Credential Offered:**
M.S., M.T.U.S., Certificate - All programs offered online only
- **English Proficiency Requirements:**
TOEFL iBT 71; IELTS 6

Program Description

The Department of Transportation, Logistics, and Finance offers an online master's degree and an online graduate certificate in Transportation and Urban Systems. The degree/certificate is awarded through the College of Business in collaboration with the Upper Great Plains Transportation Institute to provide high-quality graduate programs for students. The program's interdisciplinary approach attracts students with backgrounds in transportation and logistics, agribusiness, applied economics, civil engineering, construction management, emergency management, finance, geosciences, industrial/manufacturing engineering, and supply chain management.

The program options described below focus on: (1) urban transportation systems; (2) relationships between transportation, land use, environment, emergency response, and logistical delivery systems; (3) coordinated planning, operations, and security; and (4) the spatial dimensions of urban systems. The curriculum is built around the topics of public transportation systems, geographic information systems, freight transportation and logistical delivery systems, urban geography and land use, the environmental impacts of transportation systems, transportation cyber-physical security, and the sustainability of transportation and urban systems.

Master of Science (M.S.) in Transportation and Urban Systems

The M.S. degree **requires a thesis** and is targeted at students with strong research interests.

Master of Transportation and Urban Systems (MTUS)

This **non-thesis degree** is primarily intended for professional planners and engineers. Students enrolled in the MTUS program have more opportunities for synthesis of practice and additional course work, with less emphasis on research.

Certificate in Transportation and Urban Systems

This program is primarily targeted at practicing professionals who are unable to study in residency, but who wish to gain additional knowledge in the emerging fields of transportation and urban systems.

Admission Requirements

The Transportation and Urban Systems programs are open to qualified graduates of universities and colleges of recognized standing. To be admitted with full standing, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized learning with a minimum grade point average (GPA) of 3.0 or equivalent. For those with GPAs of 2.99 or less, the applicant should consider submitting a GMAT/GRE score to be considered for acceptance.
2. Have adequate preparation in one or more of the disciplines comprising transportation and logistics and must have professional experience or interests in community practice
3. Have shown the potential to undertake advanced study as evidenced by prior academic performance and have a stated interest in transportation and (for the M.S.) the capability to conduct transportation research
4. Submit official transcripts
5. Submit a two-page resume
6. Submit a one-page "Letter of Intent" outlining their reasons for pursuing the Transportation and Urban Systems degree/certificate
7. Submit three letters of recommendation (NA for certificate option)
8. Submit online application through the NDSU Graduate School website
9. International applicants whose first language is not English and who do not possess a U.S. bachelor's degree or higher are subject to additional requirements when they apply for admission. They must meet the minimum requirements on measures of general English language proficiency. The accepted measures of language proficiency are the TOEFL iBT 71 and IELTS 6.

Students who do not meet all requirements for admission or have deficiencies in prerequisite course work, but show satisfactory potential for graduate study, may be admitted conditionally. The conditional status may be changed to full graduate standing after the first or second semester of study, based on the student's academic performance.

Apply for Admission

To apply for admission, please visit the Admission Information page (<https://bulletin.ndsu.edu/graduate/admission-information/>).

Degree Requirements

Master of Science (M.S.) in Transportation and Urban Systems

A minimum of 30 credits is required for the degree of which 24 must be core courses. All students must take a final examination which covers the course work taken by the candidate, as well as the thesis topic as coordinated with their adviser.

Each thesis must be of sufficient depth and quality to warrant at least six (6) graduate credits. However, no more than 10 credits can be earned for any thesis. Each thesis will contribute one of the following:

- New models – may be achieved through the synthesis of several techniques, the modification of existing models, or new applications of analytical techniques to transportation/urban problems.
- Knowledge – may be accomplished through the collection and analysis of original data or the development of innovative planning techniques.

Master of Transportation and Urban Systems (MTUS)

The MTUS is a non-thesis degree. All 30 credits must be completed using the nine core courses below, and one elective course that can be any other TL course.

Certificate in Transportation and Urban Systems

The certificate in Transportation and Urban Systems will consist of a minimum of 9 credits selected from the core courses below.

Code	Title	Credits
Core Courses		
TL 751	Transportation Cyber-Physical Security	3
TL 752	Transportation Planning and Environmental Compliance	3
TL 753	Transportation System Modeling	3
TL 754	Urban Transportation Systems Analysis	3
TL 755	Context Sensitive Solutions	3
TL 756	Transportation and Land Use Integration	3
TL 757	Intelligent Transportation Solutions	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
Thesis (M.S. only)		6-10
TL 798	Master's Thesis	

Faculty

Raj Bridgelall, Ph.D.

North Dakota State University, 2015

Research Interests: Big Data Analytics, Internet-of-Things (IoT), Cloud Computing; Connected and Autonomous Vehicles (CAV), Shared Mobility, Intelligent Transportation Solutions; Signal Processing and Mathematical Modeling of Transportation Systems; Remote Sensing with Unmanned Aircraft Systems; Hyperspectral Image Analysis; Radio Frequency Identification (RFID); Real-Time Locating Systems (RTLS); Energy Harvesting and Massive Scale Autonomous Wireless Sensor Networks

Department: Transportation, Logistics, and Finance

Robert Froberg, Ph.D.

North Dakota State University, 2019

Research Interests: Transport of Rolling Stock, Equipment, and Supplies to Austere Locations, Austere Environment Sustainment Planning, Transportation Analysis and Planning for Logistics, Supply Chain Planning, Assessment, and Optimization Leveraging (Big) Data, Modeling of Supply Chains and Transportation Networks

Department: Transportation, Logistics, and Finance

Ranjit Godavarthy, Ph.D.

Kansas State University, 2012

Research Interests: Public Transportation in Small Urban and Rural Areas, Demand Response Transit and Paratransit, Bike Share, Roundabouts, Traffic Engineering and Operations, Transportation and Highway Safety

Department: Transportation, Logistics, and Finance

Pan Lu, Ph.D.

North Dakota State University, 2011

Research Interests: Connected and Autonomous Vehicles, Smart Material and Structure Health Monitoring, Big Data Analytics for Transportation, Smart Transportation, Transportation System, Asset Management, Multimodal Transportation, Geospatial Transportation Modeling

Department: Transportation, Logistics, and Finance

Jeremy Mattson, Ph.D.

North Dakota State University, 2017

Research Interests: Public Transportation, Transportation Economics, Demand Modeling, Travel Behavior, Built Environment

Department: Transportation, Logistics, and Finance

Duomo Motuba, Ph.D.

North Dakota State University, 2009

Research Interests: Transportation and Land Use Planning, Freight Modeling, Transportation Economics, Connected Automated Vehicles, Logistics and Supply Chain Management, Transportation Safety
 Department: Transportation, Logistics, and Finance

Tim O. Peterson, Ph.D.

Texas A&M University, 1988

Research Interests: Managerial Leadership, Application of Information Technology to Organizational Issues, Scholarship of Teaching

Department: Management and Marketing

Fred Riggins, Ph.D.

Carnegie Mellon University, 1994

Research Interests: Economics of Information Systems, Interorganization Systems, Adoption of New Technology, Radio Frequency Identification (RFID), Internet-of-Things (IoT), Blockchain, Cryptoeconomics, Information and Communication Technology in Microfinance

Department: Accounting and Information Systems

Robert Swearingen, Ph.D.

North Dakota State University, 2019

Research Interests: Change Management in Supply Chain Organizations, Lean Inventory Management Process Improvement Supported by Value Stream Mapping, Enterprise Information Systems Supporting Supply Chain Management

Department: Transportation, Logistics, and Finance

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Supply Chain Management and Technology, Energy Supply Chain Management, Healthcare Logistics

Department: Transportation, Logistics, and Finance

Denver Tolliver, Ph.D.

Virginia Polytechnic Institute and State University, 1989

Research Interests: Highway Systems Modeling, Multimodal Transportation Planning, Freight Transportation, Energy and Environmental Analysis

Department: Transportation, Logistics, and Finance

Women and Gender Studies

Department Information

- **Program Director:**
Ashley Baggett, Ph.D.
- **Department Web Site:**
www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/ (http://www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/)
- **Application Deadline:**
Rolling admission

The NDSU Women and Gender Studies program is an interdisciplinary academic program that focuses on women and gender issues in society, while integrating the teaching, research, and service goals of our land grant university. The program offers a graduate certificate in Women and Gender Studies that is open to students enrolled in graduate degree programs at NDSU as well as professionals who are not currently pursuing a masters or doctorate.

Career Opportunities (https://www.ndsu.edu/wgs/undergraduate_major_and_minor/major_and_minor/)

Graduate students completing the Women and Gender Studies certificate enrich the study of their discipline by receiving additional instruction in the way in which gender and sexuality functions. The perspectives and application of feminist theory deepens research in their respective field.

Increasingly, employers seek candidates who understand and support diversity and inclusiveness, which is a foundational principle in the Women and Gender Studies program. The Women and Gender Studies certificate provides the valuable expertise to advance professionals in the workplace. Educators can gain graduate credit hours necessary to increase their salary. Doctoral scholars improve their marketability by demonstrating versatility in their research and are eligible to seek positions with dual appointments in their home field and in Women and Gender Studies.

The Curriculum (https://www.ndsu.edu/wgs/graduate_certificate_in_women_and_gender_studies/)

Women and Gender Studies certificate students complete 5 credit hours in core courses. These include WGS 793: Professional Development, WGS 797S: Research, and WGS 793: Community Outreach. The Professional Development credit hour is an independent study for engagement with the field through activities such as conference presentations or event organizing. The Research credit hour is for the development of an original research paper on a gender-related topic. Lastly, the Community Outreach independent study is the capstone. As a field committed to fostering justice for all, students complete a capstone that places feminist theory into practice.

After the core courses, Women and Gender Studies certificate students explore issues of gender and sexuality through completion of 9 elective credits. These are tailored towards their individual field and include Education, Sociology, Public Health, History, and others.

Contact

To begin your certificate studies in the WGS program, contact the Director, Dr. Ashley Baggett, at ashley.baggett@ndsu.edu.

To be admitted to the WGS Certificate Program, the applicant must be a current degree-seeking student in a graduate program at an educational institution of recognized standing, with a 3.0 GPA or higher. Submit a short statement of purpose (no more than two double-spaced pages) indicating 1) reasons for pursuing a graduate certificate in WGS, 2) the experiences you've had (e.g., informal, academic, professional, volunteer) that are related to this graduate certificate, and 3) your professional goals and how this graduate certificate program will help you accomplish those goals.

To apply, please go to the Admission Information page. Decisions will be made on an ongoing, rolling basis.

Course requirements for the graduate certificate in WGS will build upon existing graduate curriculum, most of which are accessible to all disciplines. This program requires 9 credit hours of coursework (may be combined with coursework for your primary degree program); 1 credit hour of professional development; a research component worth 1 credit hour; and a community project or grant application worth 3 credit hours, for a total of 14 credit hours.

Current List of Graduate Courses that are suggested by WGS (list is not all-inclusive, and some programs are restricted to their enrolled students):

Code	Title	Credits
Coursework		9
ANTH 655	Language and Expressive Culture	
EDUC 712	Social, Cultural and Political Dimensions of Schools	
EDUC 769	Politics and Policy Analysis in Education	
ENGL 653	Social and Regional Varieties of English	
ENGL 654	Language Bias	
ENGL 656	Literacy, Culture and Identity	
ENGL 659	Researching and Writing Grants and Proposal	
HDFS 811	Developmental Concepts and Theories	
HDFS 813	Social and Emotional Development Across the Lifespan	
HDFS 830	Issues and Theories in Family Science	
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 874	Contemporary Grant Writing	
HIST 626	Women in American History	
PH 704	Public Health Management and Policy	
PH 705	Global Health	
PH 741	Social and Behavioral Sciences in Public Health	
PH 765	Cultural Competence Health Care	
SOC 610	Social Inequality	
SOC 612	Sociology of Gender	
SOC 617	Sociology Of The Family	
SOC 624	Feminist Theory and Discourse	
SOC 639	Social Change	
WGS 793	(Professional Development)	1
WGS 797S	(Research Component)	1
WGS 793	(Community Project or Grant Application)	3
Total Credits		14

Ashley Baggett, Ph.D.

Associate Professor and Director of WGS

Louisiana State University, 2014

Research Interests: Women's History/Gender Studies, 19th Century U.S., Southern History

Alison Bertolini, Ph.D.

Associate Professor, English and Women and Gender Studies

Louisiana State University, 2009

Research interests: Contemporary American literature, gender studies, ethnic literature, postcolonial literature, women's studies

Dena Wyum, M.S.

Lecturer, Human Development and Family Science

North Dakota State University, 2008

Allied Faculty**Kelly Cameron, Ph.D.**

Senior Lecturer, English

Texas Christian University, 2012

Research Interests: Feminist approaches to rhetoric and cultural rhetorics

Kristen Fellows, Ph.D.

Assistant Professor, Sociology and Anthropology

University of Pennsylvania, 2013

Research Interests: Feminist archaeology and anthropology, ethnohistory and oral histories

Holly Hassel, Ph.D.

Professor, English

University of Nebraska, 2002

Research Interests: Feminist pedagogy

Christi McGeorge, Ph.D.

Professor, Human Development and Family Science

University of Minnesota, 2005

Research Interests: Influence of heterosexism and homophobia on clinical practice and training, gender equity in therapy, gender equity in higher education

Carrie Anne Platt, Ph.D.

Associate Professor, Communication

University of Southern California, 2008

Research interests: Rhetorical approaches to emerging technologies and identity in public culture as well as digital media and communication pedagogy

Christina Weber, Ph.D.

Associate Professor, Sociology and Anthropology

State University of New York (Buffalo), 2005

Research Interests: The sociology of memory and trauma, photography's impact of the historical understanding of the Great Depression, women and the dust bowl

Graduate Admission Information**Admission Requirements**

North Dakota State University is fully committed to equal opportunity in employment decisions and educational programs and activities, in compliance with all applicable federal and state laws and including appropriate affirmative action efforts. NDSU does not discriminate in its programs and activities on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, participation in lawful off-campus activity, physical or mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, spousal relationship to current employee, or veteran status, as applicable.

Admission to the Graduate College is a selective process intended to identify applicants who are outstanding among recipients of baccalaureate degrees. The following minimum qualifications are required of all students seeking an advanced degree:

1. The applicant must have a baccalaureate degree from an educational institution of recognized standing.
2. The applicant must have adequate preparation in the chosen field of study and must show potential to undertake advanced study and research as evidenced by academic performance and experience.
3. At the baccalaureate level, the applicant must have earned a cumulative grade point average (GPA) of at least 3.0, or equivalent, to attain full standing in a graduate degree program. Applicants whose last degree completed is a graduate degree may be admitted in full standing if the final GPA of that degree is at least 3.0 or equivalent.
4. Each program may set higher qualifications and may require the submission of additional evidence of academic performance.

A student shall be permitted to register for graduate study only after formal admission. Programs make recommendations on all applications, but the final admission decision is the responsibility of the Dean of the Graduate College.

Application Requirements

Complete the Online Application (<https://www.ndsu.edu/gradschool/apply/>). The application fee is \$35. You will be prompted to pay the fee when you have completed all of the required fields in the online application. If you choose to apply to more than one graduate program, you must submit a separate application using a new email address, statement of purpose, and \$35 application fee. If you would like to use any other previously submitted documents, please email us at ndsu.grad.school@ndsu.edu.

A Statement of Purpose is required for certificate and degree programs. State your reasons for pursuing graduate study, specifying your special interests within your chosen discipline and including your background preparation in that area. Mention any relevant skills or experience that you have acquired. Please refer to your intended program page to see if it has any additional requirements regarding the statement.

Official transcripts (transcripts in a sealed, stamped envelope from the granting institution and signed by the school official responsible for issuing such records, i.e. Registrar or Controller of Examinations) of all previous undergraduate and graduate records must be received by the Graduate College before the application file is considered complete. When a transcript is submitted in advance of completion of either undergraduate or graduate studies, an updated transcript showing all course credits, grades, and degree completions must be provided prior to initial registration at NDSU.

Online letters of recommendation are required before action is taken on any application. Three recommendations are required unless otherwise noted. **We do not accept paper, emailed, or faxed letters.**

Programs requiring or recommending Graduate Record Examination (GRE) or Graduate Management Admission Test (GMAT) scores are indicated on their information pages. Minimum TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System) scores by program are also listed on English Language Test Score Requirements (<https://www.ndsu.edu/gradschool/apply/international/>) under "Additional Information".

Application Deadline

All application materials (http://www.ndsu.edu/gradschool/prospective_students/domestic_applicants/how_to_apply/#c30011) are due at least one month before registration for U.S. applicants; several programs have earlier deadlines. (See program sections (<https://www.ndsu.edu/gradschool/programs/>) within the Graduate Bulletin for details.)

For international students, the completed application (<http://bulletin.ndsu.edu/graduate/admission-information/ndsugrad.force.com/Application/>) and all required documents and test scores must be received by the Graduate College prior to May 1 for fall semester and prior to August 1 for spring semester unless the department has other posted deadlines. This deadline applies to students matriculating from abroad because of the time required to obtain current financial information, determine student status, and issue the appropriate immigration form.

Action on Applications

Admission of all graduate students requires approval by the Dean of the Graduate College. All applicants who have submitted the required application materials will receive notification of their admission decision by email.

Admission of International Students

North Dakota State University welcomes international students as part of the student body, and the Graduate College encourages applications from qualified students throughout the world. More than 25% of the approximately 2,100 graduate students are international.

In addition to meeting the previously stated admission requirements, to qualify for admission in an advanced degree program, all international students must demonstrate proficiency in English and must provide evidence of adequate financial support for themselves and any dependents for the duration of their graduate program.

Language Proficiency for Admission

English proficiency must be demonstrated prior to admission by obtaining a minimum score of 525 (paper-based test) or 71 (internet-based test) on the Test of English as a Foreign Language (TOEFL) or a score of 6 on the International English Language Testing System (IELTS). Some programs require higher scores for admission to their degree programs. The test date must be within two years of the date of the application to the Graduate College. Information about these tests is available on our website (http://www.ndsu.edu/gradschool/prospective_students/international_applicants/english_language_score_requirements/#c41215).

The TOEFL or IELTS score may be waived for students who have been raised in one of the following countries or who have earned a bachelor's degree or higher from a recognized institution in one of the following countries.

Antigua and Barbuda	Liberia
Australia	Mauritius
Bahamas	Micronesia (Federated States of)
Barbados	New Zealand
Bermuda	Nigeria
Canada (except Quebec)	Saint Lucia
Dominica	Saint Vincent and the Grenadines
Gambia	Scotland
Ghana	Sierra Leone
Great Britain	Solomon Islands
Grenada	Trinidad and Tobago
Guyana	United States
Ireland	Zambia
Jamaica	Zimbabwe

Required Student Health Insurance

All international students in F and J status are required by the North Dakota University System (NDUS) to purchase the approved health insurance policy through UnitedHealthcare StudentResources. The charge for health insurance is due no later than the sixth week of each semester, and it is to be paid onto your student account. For more information on payment deadlines and the policy itself, please see the following website: <https://www.ndsu.edu/international/insurance> (<https://www.ndsu.edu/international/insurance/>).

Immunization Requirements

Please see the NDSU Student Health Service 'Immunization' webpage for important information about immunizations and all other immunization requirements. To familiarize yourself with these requirements, please visit this website: <https://www.ndsu.edu/studenthealthservice/immunizations/>.

Language Proficiency for Teaching Assistants

There are two recognized categories of teaching assistants:

(1.) Graduate Teaching Assistants (who have direct contact with students) must have one of the following minimum scores:

- TOEFL iBT 81 (speaking 23 or above and writing 21 or above)
- IELTS 7.0 (speaking and writing 6.0 or above)
- PTE Academic 54 (speaking 62 or above and writing 56 or above)

(2.) Graders (who have no direct contact with students) must have one of the following minimum scores*:

- TOEFL iBT 79 (speaking 19 or above and writing 21 or above)
- IELTS 6.5 (speaking 5.5 or above and writing 6.0 or above)
- PTE Academic 53 (speaking 51 or above and writing 56 or above)

*Graders may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the GTA language requirements listed under (1.) above OR successfully complete the following courses:

1. LANG 701 English Language and Classroom Skills for International GTAs
2. LANG 702 English Language Tutorial for International GTAs

Admission Status

Graduate students will be admitted under one of the following classifications:

Full Graduate Standing

These students have met all requirements for admission and have been accepted by a program leading to a graduate degree. A student must have full graduate standing to receive a graduate degree.

Conditional Standing

Students in conditional standing do not meet all requirements for admission or have deficiencies in prerequisite course work but show potential for successful graduate study. Evidence must be provided showing that the applicant's potential is not adequately reflected by his or her record. In making this recommendation, the program must specify standards of performance that must be satisfied for a change in status to full graduate standing.

Any student admitted in CONDITIONAL status is automatically placed on academic WARNING until the conditions of admission are met. If a student on academic warning fails to achieve a cumulative GPA of at least 3.0 in the subsequent semester of attendance, the student will be placed on academic probation. The student may not earn more than 12 semester hours of graduate credit while in conditional status.

Non-Degree Enrollment

This category is for individuals who desire to pursue study beyond the baccalaureate degree for personal growth and improvement of skills but not in order to work toward an advanced degree objective. To become a non-degree student, individuals must submit the online application form and fee (and English proficiency test score, if applicable). Students must have the prerequisite courses or background/experience necessary for the course or courses in which they desire to enroll. This may require consultation and approval from course instructors. In courses with limited enrollment, preference will be given to degree-seeking students.

Students enrolled with non-degree status are not eligible for graduate assistantships, tuition waivers, or federal title IV student financial assistance. Students in this category are affiliated with the Graduate College and not an academic program. No more than 10 credits taken under the non-degree status with a grade of B or higher can be transferred to any official program of study should there be, at any future date, a decision to seek degree classification. Professional development graduate courses (numbered 600) are not eligible for graduate degree programs and may be taken without formal admission to NDSU.

Change in Classification

Students enrolled with non-degree status may subsequently desire to be considered for admission to the Graduate College to pursue an advanced degree. Such a change in status may be accomplished for a subsequent term by submitting a complete application to the Graduate College as a degree-seeking student. The student must be acceptable to a specific program. Appropriate course credits (no more than 10) earned in the non-degree status may be used to fulfill graduate degree requirements if approved by the student's program committee and the Dean of the Graduate College. No course taken in the non-degree status for which the grade is less than B will be permitted on a plan of study for a graduate degree.

Graduate College Policies

- General Policies (p. 978)
- Master's Degree Policies (p. 982)
- Doctoral Degree Policies (p. 986)
- Graduate Certificate Policies (p. 991)
- Graduate Assistantship Policy (p. 992)
- English Language Proficiency Procedure for Graduate Teaching Assistants (p. 994)
- Graduate Student Appeals Process (p. 995)

General Policies

Graduate Courses

Courses approved at the 600, 700 and 800 level may be taken for graduate credit and used to satisfy course requirements on the student's graduate plan of study.

Didactic courses are those courses approved for graduate credit numbered 601-689, 691; 700-789, 791; 800-889, 891. Courses numbered 690, 692-699, 790, 792-799, 890, 892-899 are considered special or experimental courses and are not to be included as didactic courses on a plan of study.

Courses that a student has used to fulfill the requirements of a baccalaureate degree may not be used on that student's graduate plan of study, unless taken as part of an accelerated degree program.

Enrollment Status

- Students must be **registered for at least one credit fall and spring semester** until all degree requirements are completed, including Graduate School approval of the thesis, paper or dissertation.
- Nine credits are considered a full-time graduate load.
- Graduate Assistants working 20 hours per week are considered full-time if registered for five or more graduate credits. Number of credits less than five are considered part-time status.
- To receive financial aid, students must be enrolled at least half-time (i.e. 5 credits). Loan deferment may also require full- or half-time status. Eligibility varies with financial aid programs; students should contact their lender for requirements.

Registration for Research Credit

- A student conducting research for the disquisition is to be enrolled in 797, 798 or 899 for the number of credits specified on the plan of study.
- Such registration is required even in absentia when faculty and/or administration time is consumed in manuscript review, communication, and other forms of assistance.

Time Limitations

- Master's degree program course work that is more than seven (7) calendar years old at the time of the final examination cannot be used to satisfy degree requirements.
- Doctoral degree coursework that is more than ten (10) years old at the time of the final examination cannot be used to satisfy degree requirements.
- These time limits apply to transfer credit as well as NDSU credit.
- The student will have one (1) year from the date of the final examination to complete the Graduate School disquisition review process and all other degree requirements. Should the disquisition not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final examination.
- If a period of time two years or greater lapses before the disquisition is approved by the Graduate School, the student must reapply to the Graduate School, redefend the disquisition and register for a minimum of two credits.

Continuous Enrollment

- Students are required to register for at least one credit each semester (fall and spring) until all degree requirements are completed, including Graduate School approval of the thesis, paper, or dissertation. Students taking their final examination in the summer semester must register for summer semester.
- Degree approval will be delayed until a student registers for one credit for each fall and spring semester in which he/she was not enrolled and not on a Leave of Absence, up to four (4) credits.
- A student who has not registered for longer than a continuous two-year period must also reapply for admission and is subject to the degree requirements at the time of readmission.

Leave of Absence

Students who interrupt their graduate program prior to the completion of all degree requirements must obtain a leave of absence, using the Request for Leave of Absence (<https://powerforms.docuSign.net/dfef263d9-611c-4814-a1ef-14376c97f7e8/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) from Graduate Studies form. A leave may be taken for up to two (2) years at which time a student must reapply to the Graduate School.

NOTE: Leaves of absence do not amend in any way the seven and ten-year time limitations.

Academic Standing

- A student must have a cumulative grade point average (GPA) of at least 3.0 to be in academic good standing and to receive a graduate degree.
- All courses taken by a graduate student for which grades are given will be used in calculating the GPA.
- Credits taken as Satisfactory or Unsatisfactory are not used in calculating the GPA.
- When a course has been repeated, both grades will appear on the transcript, but only the second grade will be used in calculating the GPA. A specific course can be retaken only once, and only three total courses can be retaken.

- Grades of A, B, C or S may be used to fulfill graduation requirements. Programs and/or supervisory committees may require a higher grade than C in certain courses.
- Earning more than two grades of C, D, F or U may be grounds for dismissal upon recommendation by the program administrator.

These minimal scholastic requirements apply to each student enrolled in the Graduate College. Additional requirements may exist for certain graduate programs.

Academic Warning

Any student in GOOD STANDING whose cumulative GPA drops to less than 3.0 at any time of attendance is automatically placed on academic WARNING. Any student admitted in CONDITIONAL status because of grade deficiency is automatically placed on academic WARNING. A student on academic WARNING cannot register for the following semester until the grades for the current semester post.

If a student on academic WARNING fails to achieve a cumulative GPA of at least 3.0 in the subsequent semester of attendance, then the student will be placed on academic PROBATION.

Academic Probation

A student on academic PROBATION may not continue the pursuit of a graduate degree program without a recommendation from the appropriate program administrator and a waiver from the Dean of the Graduate College. This recommendation must include a review of the student's current status and a proposed plan of remediation which provides the student an opportunity to return to a cumulative GPA of at least 3.0 within one additional semester (fall or spring) for full-time students and two semesters for part-time students (i.e. students taking 5 credits or fewer).

The remediation plan must be developed in collaboration with the adviser and approved by the graduate program coordinator or department chair; the approved remediation plan has to be submitted to the Graduate College in order to receive a waiver from the Dean of the Graduate College.

This plan must include:

- the specific course(s) you plan to take
- verification that the course(s) will be offered
- the grade you plan to earn in order to return to a cumulative GPA of at least 3.0 within one semester
- any additional information that addresses past obstacles to academic success (optional).

The remediation plan must be submitted and approved in time for the student to register for the academic term (fall or spring) that immediately follows the term in which the student was placed on probation. If the student does not submit an acceptable plan in time to enroll for the next academic term (fall or spring), or if the cumulative GPA is not at least 3.0 after the probationary period, the student will be dismissed from his or her graduate program.

A student on academic PROBATION is not eligible for a graduate assistantship or tuition waiver.

Dismissal from the Graduate College

Graduate students may be suspended or dismissed from NDSU as a result of failure to meet our scholastic standards, academic or professional misconduct, insufficient progress toward a degree, failure to meet professional expectations or standards or failure to submit an acceptable remediation plan. Students suspended or dismissed from the Graduate College are not eligible for admission into any degree-granting or certificate program or into non-degree status for a period of at least one calendar year from the date of their suspension or dismissal.

Suspension or dismissal does not become complete until the completion of any appeal process (p. 995).

Family and Medical Accommodation Policy for Graduate Students

The Graduate School at NDSU is committed to promoting an environment where students can successfully balance their academic and family responsibilities. The goal of this policy is to provide consistent, equitable treatment to all graduate students, regardless of family status, by providing timeline extensions for completing preliminary/qualifying examinations and by offering modified duties to students experiencing a serious health condition or needing to provide care to a new child or a seriously ill family member.

1. Extensions for Completing Preliminary/Qualifying Examinations, Final Examinations, and/or Disquisitions

Eligibility:

A graduate student is eligible to apply for a time extension on completing preliminary/qualifying examination, final examination, and/or disquisition upon showing that they are:

1. In good academic standing and making progress toward degree completion, and
2. Undergoing childbirth, caring for their newborn, caring for their child with a serious medical condition, adopting a child, accepting foster placement of a child, experiencing their own serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities (medical certification may be required).

Length of Extensions:

While each extension granted under this policy will be assessed on a case-by-case basis, absent extraordinary circumstances, the additional time granted by this policy will not exceed two years.

A graduate student undergoing childbirth, adopting a child, or accepting foster placement of a child shall be entitled to receive an extension of up to one extra year for completing preliminary/qualifying examination, final examination, and/or submitting a disquisition.

A graduate student experiencing their own serious medical condition, caring for their child with a serious medical condition, or experiencing a serious medical condition of a spouse/partner or parent for which they have caretaker responsibilities shall be entitled to receive an extension of up to six extra months for completing a preliminary/qualifying examination, a final examination, and/or submitting a disquisition.

Application/Approval Process:

Graduate students who wish to obtain an extension under this policy must document their eligibility in writing to their academic unit prior to the effective date of the extension – retroactive requests will not be considered, absent extraordinary circumstances. The student's academic unit and the Graduate School will then assess the student's eligibility and approve/deny the extension. Additionally, international students on a visa must have their extension approved by the Office of International Student and Study Abroad Services.

Leave of Absence

Students requesting an extension may also choose to take a leave of absence from their graduate program. International students will need to consult with the Office of International Student and Study Abroad Services to determine if they are eligible for a leave of absence.

2. Modified Duties for Graduate Assistants

Eligibility:

A graduate assistant is eligible for "modified duties" if the graduate assistant:

1. Becomes a parent through childbirth, adoption, or foster placement of a child;
2. Has a health condition that makes him or her unable to perform regular duties but does not necessitate a reduction in workload; or
3. Will be caring for a child, spouse/partner or parent who has a serious health condition.
4. Must have served as a graduate assistant for at least one academic term.

Definition and Length of Modified Duties:

"Modified duties" means a change to duties and goals without reduction of stipend for a limited period of time. A graduate assistant taking modified duties will still be at a 100% workload and 100% stipend; however, the nature of the responsibilities for this time period will be adjusted. Modified duties will include a revision of workload for up to the equivalent of a semester. If warranted and supported by appropriate medical documentation, graduate students can be excused from most, if not all, of their regular duties for up to six weeks without a reduction in pay. All eligible students will be granted a Parental Accommodation period for up to six weeks immediately following the birth of a child or the adoption of a child under the age of 6 for which the student has parental responsibilities. (Additional time may be granted based on medical documentation of exceptional medical circumstances experienced by the student or his/her child, spouse, partner, or dependent parent.)

Regardless of circumstances, modified duties agreements must conclude within 12 months.

Application/Approval Process

A graduate assistant requesting modified duties shall document their request in writing to their supervisor and department chair/head. The graduate assistant and the department will engage in an interactive process to determine how the graduate assistant's duties will be modified and the duration of the modified duties. In the event that an agreement cannot be reached between the graduate assistant and the department, the Dean of the Graduate School shall assist in reaching an agreement. To ensure that all parties are operating under the same understanding, the agreement for modified duties shall be put in writing. Graduate assistants accepting modified duties are subject to the regular evaluation procedures used in the program; however, such evaluations shall be based on the agreed upon modified duties.

Master's Degree Policies

Degrees Offered

North Dakota State University offers Master of Arts, Master of Science and a series of professional master's programs.

Master of Arts (M.A.)/Master of Science (M.S.)

NDSU offers master's degrees according to the following plans. Not all programs offer all three plans. Candidates for the Master of Arts degree will meet the general requirements and those specific requirements in the humanities or social and behavioral science; these typically include two years of a foreign language.

The Plan C degree is primarily intended for professional degree programs.

In addition, the three plans differ in the composition of the student's supervisory committee and required submissions to the Graduate School upon degree completion.

Plan A: Thesis-based Master's

The thesis typically includes a problem statement, a review of existing literature relevant to that problem, and the creation and presentation of new knowledge in providing a solution to the problem. Each student assembles a supervisory committee as described on the next tab. Each candidate is required to pass a final oral examination in which the supervisory committee serves as the examining committee. Following a successful defense, the candidate will submit an electronic copy of their thesis to the Graduate School for review.

Plan B: Master's Paper/Comprehensive Study-based Master's

The Plan B master's student will develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. Note that under this degree, the new knowledge being created is limited, and this is the primary difference between the Plan A and Plan B degrees. The precise nature of the individual creative component is defined by the program. Examples of possible creative components include a comprehensive paper, a portfolio, or an integrated field experience. Candidates for the Master of Arts degree will meet the general requirements and specific requirements in the humanities or social and behavioral sciences; these typically include two years of a foreign language.

Each candidate would assemble a supervisory committee and pass a final oral examination. Following a successful defense, the candidate will compose an executive summary or assemble other appropriate documentation as defined by the program to be submitted to the Graduate School. This submission to the Graduate College is to be approved by the student's supervisory committee.

Plan C: Culminating Experience-based Master's

Plan C is designed for programs in which a well-defined culminating experience is more important than is an individual creative component. This degree will most frequently be available in professional degree programs. Each program will define a culminating experience such as a capstone course, a written examination, or some other approach to measure the candidate's understanding of the relevant material in the area.

Candidates must submit the Graduation Application by the appropriate deadline during the semester in which they intend to graduate. There is a \$25 processing fee that may be paid online. No transcript or diploma will be issued until this fee is paid. For programs that require Graduate School approval of the Final Examination, candidates must submit the Notification of Scheduled Examination and the Report of Final Examination by the appropriate deadlines.

Professional/Non-Thesis Degree Programs

Master of Accountancy (M.Acc.)

The Master of Accountancy (M.Acc.) program at North Dakota State University is a non-thesis, professional program structured to advance the knowledge of qualified students with an undergraduate accounting degree. The program is designed to have students complete graduate studies needed to advance their careers whether their career be in public accounting, corporate accounting, or government accounting and prepare them for the Certified Public Accountant (CPA) exam.

Master of Athletic Training (M.A.Trg.)

The Master of Athletic Training is a professional program that is accredited by the Commission on Accreditation of Athletic Training Education (CAATE). The M.A.Trg. will prepare students to take the Board of Certification, Inc. (BOC) examination and earn the 'ATC' credential. Didactic courses and clinical experience courses focus on prevention, assessment, treatment and rehabilitation of injuries resulting from physical activity.

Master of Business Administration (M.B.A.)

The Master of Business Administration degree is a non-disquisition, professional degree program structured to serve qualified students with any undergraduate degree. The program has two general parts: a foundation course requirement involving up to 30 semester credits and an M.B.A. (common body of knowledge) graduate course requirement of 30 semester credit hours.

Master of Construction Management (M.C.M.)

The Master of Construction Management is an online professional program consisting of 30 credits of course work and the Associate Constructor (AC) Exam.

Master of Education (M.Ed.)

The Master of Education degree is a non-disquisition, practitioner-oriented degree for teachers and school counselors. Candidates for this degree will meet the general requirements as well as specific requirements established by the School of Education.

Master of Engineering (M.Engr.)

The Master of Engineering in Electrical and Computer Engineering is a course work only program requiring a capstone consisting of a portfolio or written exam. Faculty are experienced researchers in the following areas: Signal Processing Group, Biomedical Engineering, Power/Power Electronics, Integrated Circuit, Electromagnetics, and Computer Engineering. The Department of Electrical and Computer Engineering is also a key contributor to NDSU's Research and Technology Park.

Master of Managerial Logistics (M.M.L.)

The Master of Managerial Logistics is a 36 graduate credit professional degree program targeted specifically at career military officers, Department of Defense civilians, and other logistic professionals.

Master of Music (M.M.)

The Master of Music in performance and conducting is the professional degree in music designed for performers and conductors wishing to augment and refine their skills. The M.M. in Music Education is designed for music teachers who wish to update and increase their practical pedagogical knowledge.

Master of Natural Resources Management (M.N.R.M.)

The Master of Natural Resources Management degree is designed as a professional, non-thesis degree program specifically designed for students holding a Bachelor of Science degree in Natural Resources Management or a closely related field who are seeking an educational opportunity for advanced course work culminating in a professional terminal degree.

Master of Public Health (M.P.H.)

Public health is defined as the practice of helping members of society live healthier, longer lives. More specifically, public health focuses on improving the general health of communities through efforts to monitor the spread of diseases, initiatives (both clinical and policy-oriented) to prevent disease and disability, and by promoting healthy lifestyles through education and community engagement. NDSU offers the M.P.H. degree with specializations in American Indian public health, health promotion, management of infectious disease, and public health in clinical-systems.

Master of Software Engineering (M.S.E.)

The Master of Software Engineering degree is a non-thesis, professional degree program for students who want to update or upgrade their credentials in software engineering. The M.S.E. program teaches current skills and knowledge in software engineering, and is offered through on-campus or online courses.

Master of Transportation and Urban Systems (M.T.U.S.)

The Master of Transportation and Urban Systems is a non-disquisition degree that is primarily intended for professional planners and engineers. Students in the M.S. and M.T.U.S. programs can select from a common set of courses. However, students enrolled in the non-disquisition (M.T.U.S.) program have more opportunities for synthesis of practice and additional course work, with less emphasis on research.

Education Specialist (Ed.S.) in Educational Administration

In addition to offering several Master of Education (M.Ed.) programs preparing candidates for administration credentials in North Dakota, the Educational Leadership program prepares students for Master of Science (M.S.) and Education Specialist (Ed.S.) degrees in Educational Administration. Programs meet certification requirements in the various areas appropriate to elementary and secondary administration.

Supervisory Committee

Plan A & Plan B

The supervisory committee should be formed during the term immediately after the major adviser is identified for the student, and members should be identified before the plan of study is formulated so that all committee members have a chance to contribute to the Plan of Study. The supervisory committee agreed upon by the major adviser and student, and approved by the program administrator and the academic dean shall be recommended to the Dean of the Graduate College for final approval.

The supervisory committee will have at least three members. The members consist of:

1. The major adviser, who must be a full or affiliate member of the graduate faculty Level 1 or 2. The student selects the adviser with approval of the program administrator and the Dean of the Graduate College. The major adviser-student relationship must be a mutually acceptable one. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the Plan of Study. The remaining members of the committee must be agreed upon by the student, the major adviser, and the Dean of the Graduate College.
2. A second member, who must be a full or affiliate member of the graduate faculty.
3. A third member, who could be either a faculty member from outside the adviser's home department, affiliate member of the graduate faculty, or a qualified off-campus expert in the field.

If the third member, or additional committee member(s) is not a full or affiliate member of the graduate faculty, the approval of the Dean of the Graduate College is required. To request approval, the Plan of Study must include 1) a memo from the program/department chair explaining the qualifications of and rationale for this person to serve on the committee and 2) a copy of the person's curriculum vitae.

Plan C

1. The Supervisory Committee for programs that require an examination shall consist of at least three members:
 - a. The major adviser who must be a full or affiliate member of the graduate faculty Level 1, 2, or 3;
 - b. a second member who must be a full or affiliate member of the graduate faculty;
 - c. a third member who could be either be a full or affiliate faculty member or a qualified off-campus expert in the field. All three members may come from within the same program.
2. Programs that are coursework-only inclusive of the final cumulating experience (e.g., a capstone course, a for-credit internship) do not require a supervisory committee to be formed. The advisor, who must be a full or affiliate member of the graduate faculty, will provide the signature approving the student's Plan of Study and Graduation Application.

Plan of Study

The Plan of Study shall include the specific courses the student is expected to complete and any other special requirements of the particular master's degree that the student is seeking. The Plan of Study must be filed with the Graduate School by the end of the student's second semester of study. Revisions may be made with the Request for Change to Plan of Study (<https://powerforms.docusign.net/20c075c4-741c-4c43-8767-4c48338ddfaf/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) form. Plans of Study, and all changes to them, must be approved by the student, the supervisory committee, the graduate program leader of the student's program, and the Dean of Graduate Studies.

NDSU has minimum requirements for master's degrees. These are outlined below. Once these minimum requirements have been met, any other graduate courses can be used to satisfy the remaining Plan of Study requirements. Each program has the responsibility of defining the requirements for a major in its disciplinary area. This information should be made available to students electronically and/or in the program handbook.

A student may use up to 10 credits taken as a non-degree NDSU graduate student toward the degree.

Plan A Master's Degree

- Minimum 30 credits total
- 16 of the 30 must be didactic credits
- 6-10 credits of research (798 Master's Thesis)

Plan B Master's Degree

- Minimum 30 credits total
- 21 of the 30 must be didactic credits
- 2-4 credits of research (797 Master's Paper)

Plan C Master's Degree

Some programs have set curriculum and their own Plan of Study.

Transfer of Credit

All graduate credits used to meet the requirements of a master's degree must be approved by the supervisory committee, the program administrator, and the Dean of the Graduate College. A candidate for the master's degree must petition in order to transfer up to a maximum of 10 semester hours of graduate credit from another institution to satisfy course requirements on the Plan of Study. Credits are transferred at the time the Plan of Study is approved.

Transfer credits

1. Graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) is eligible for acceptance in transfer (credits from international institutions can be transferred only if approved by a committee from the student's program);
2. must carry only grades of A or B on a 4.0 scale;
3. must have been earned within a 7-year period at the time of the final examination;
4. must be graduate level;
5. must not be a continuing education, correspondence, extension, or workshop course;
6. must not be internship, individual study, special problem, or research (disquisition) courses, or courses graded Pass/Fail or Satisfactory/Unsatisfactory;
7. must not have been used to fulfill the requirements of a baccalaureate degree;
8. must be verified by an official transcript; and
9. will not be used in calculation of the grade point average.

It is the responsibility of the student to provide official transcripts of graduate courses taken elsewhere to the Graduate College.

NOTE: The Special Problem credits of item (6) above are equivalent to North Dakota State University's 696/796 Special Topic credits.

Multiple Graduate Degrees

On occasion, a student may be allowed to work at satisfying the requirements of two graduate degrees concurrently. In completing all program and Graduate College requirements for two degrees, a maximum of 10 graduate credits of course work can be applied to both programs of study as approved by all members of both supervisory committees, the two program administrators, the academic dean(s), and the Dean of the Graduate College.

The disquisitions must differ substantially and must result from substantial work completed independently in each discipline. There are two final examinations. The appropriate time limitation applies to all course work.

A student pursuing multiple graduate degrees must maintain continuous enrollment in each program.

Master's Degree with Two Major Areas

Under special circumstances, a student may pursue one master's degree with two major areas. Such a program must have the concurrent recommendation of the administrators of the two programs. The Plan of Study shall clearly delineate the course work required for each major area.

- A minimum of 40 credit hours is required, including at least 14 graduate course credits in each of the two major areas.
- No more than 10 of the required 40 credits shall be research credits under the Plan A master's, while no more than three of the required 40 credits shall be paper credits under the Plan B master's.
- The student is required to conduct interdisciplinary scholarly work culminating in a disquisition acceptable in both major areas.

Final Examination (Plan A and B)

The candidate shall pass a final examination before being awarded the master's degree. The supervisory committee shall serve as the examining committee with the major adviser serving as chair.

The final examination will cover the disquisition and may cover course work taken by the candidate, seminar papers, or oral examination paper and fundamental knowledge. Once a date is finalized with the student's supervisory committee, the Notification of Scheduled Examination (<https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) form must be filed with the Graduate College at least two (2) weeks prior to the examination. If the completed form is not submitted two weeks prior, it will not be processed and the exam must be rescheduled for a later date.

The disquisition in a near final form must be given to the committee members no fewer than seven (7) days prior to the examination. If this seven (7)-day stipulation cannot be met, the student must either secure the concurrence of all committee members or reschedule the examination. At the conclusion of the examination, the examining committee shall record, in writing, approval or disapproval. The Report of Final Exam (<https://powerforms.docusign.net/3e7ecb3e-540f-48ff-a0e4-0c098d3bd8b4/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) must be filed with the Graduate College within 14 days following the exam.

A negative vote by two or more members of the student's committee will signify failure of the final examination. The student may repeat the examination only upon permission from a majority of the supervisory committee. The committee will set a date at least one month after the failed examination. Exceptions to this time limit will be considered by the graduate dean upon presentation of written justification from the chair of the committee in consultation with the committee.

Should the examination be failed twice, the student will not be given a third examination except by recommendation of the examining committee, program administrator, and special approval of the Dean of the Graduate College following consultation with the Graduate Council.

To participate in commencement, the student must pass the final examination. Students who complete graduation requirements during the summer are eligible to participate in either May or December commencement ceremonies within the calendar year of their graduation. To participate in the May commencement exercises, students must be registered in the remaining graduation requirements for the summer session of the same year.

IRB, IBC, and/or IACUC Approval

If a proposed graduate research project involves human, animal, or biohazard subjects, it must be submitted for review and approval by the Institutional Review Board (IRB), the Institutional Animal Care and Use Committee (IACUC), and/or the Institutional Biosafety Committee (IBC). This process should be initiated by the student after his or her supervisory committee has approved the final research design, because IRB, IBC, and/or IACUC approval must be obtained **before** the research project commences and cannot be granted retroactively. A copy of the appropriate approval letters is required when the disquisition is submitted for editing.

Disquisitions that involve research using humans or animals as subjects or using biohazard materials will not be approved by the Graduate College if such research has not been previously approved by the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), or Institutional Biosafety Committee (IBC) as appropriate. Every effort should be made by advisers to see that students are aware of these University requirements.

Doctoral Degree Policies

Degrees Offered

Doctor of Musical Arts (D.M.A.)

The D.M.A. is the terminal professional practical degree in music, designed for performers and conductors wishing to acquire the highest performance abilities.

Doctor of Nursing Practice (D.N.P.)

The Doctor of Nursing Practice degree is a clinical doctorate offered for post baccalaureate nurses with specialization as a Family Nurse Practitioner. An individually-tailored program of study for the D.N.P. is also available for the certified advanced practice nurse with a master's degree.

Doctor of Education (Ed.D.)

The Doctor of Education (Ed.D.) is available with two options: 1) Institutional Analysis and 2) Occupational and Adult Education. The degree requires extensive field service involving qualitative and/or quantitative research, leading to a dissertation that will apply a theory at an institution.

Doctor of Philosophy (Ph.D.)

The Doctor of Philosophy degree is awarded in recognition of high scholarly attainment as evidenced by a period of successful advanced study, the satisfactory completion of prescribed examinations, and the development of an acceptable dissertation covering some significant aspect of a major field of learning.

Residence Requirements

Graduate study for the Doctor of Philosophy degree normally requires a minimum of three (3) years of full-time study beyond the baccalaureate degree. A student who has a master's degree or equivalent must devote at least one of the two remaining academic years of study in residence at North Dakota State University.

Language Requirements

Some graduate programs have a language requirement and, if so, the program will determine the language or languages applicable to the candidate's field of study. International students whose native language is not English may satisfy the language requirement in their native language, providing their graduate program approves. In these cases, the basis for proficiency will be the candidate's use of English, rather than the foreign language.

Language proficiency is certified by the Department of Modern Languages.

Supervisory Committee

The supervisory committee should be formed during the term immediately after the major adviser is identified for the student, and members should be identified before the plan of study is formulated, so that all committee members have a chance to contribute to the Plan of Study.

The supervisory committee will have at least four members. The members consist of:

1. The major adviser, who must be a full or affiliate member of the graduate faculty Level 1. The student selects the adviser with approval of the program administrator and the Dean of the Graduate College. The major adviser-student relationship must be a mutually acceptable one. The major adviser will act as the chair of the student's supervisory committee and will be in charge of the Plan of Study. The remaining members of the committee must be agreed upon by the student and the major adviser.
2. A second member, who must be a full or affiliate member of the graduate faculty.
3. A third member, who could be either a faculty member or a qualified off-campus expert in the field. If this committee member is not a full or affiliate member of the graduate faculty, the approval of the Dean of the Graduate College is required. To request approval, the Plan of Study must include 1). a memo from the program/department chair explaining the qualifications of and rationale for this person to serve on the committee and 2). curriculum vitae.
4. The Graduate School Representative (GSR) is chosen by the student, in consultation with the committee chair, at the time of the supervisory committee formation.

Eligibility Requirements

The GSR must be

- a full member of the graduate faculty, AND
- be either a tenured faculty member outside the committee chair's/co-chairs' home department(s) OR
- a faculty member outside the primary college of the committee chair/co-chairs.
- If the student is in an interdisciplinary program, the GSR must also be outside of that program.
- be clear of any conflicts of interest with either the student or the committee chair/co-chairs. Examples of possible conflicts of interest may include budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair.

The role of the GSR is to ensure that

- Graduate College policies are followed,
- expectations for the student's performance are reasonable,
- interactions with the supervisory committee are conducted on a professional basis.
- The GSR will sign the exam form as a confirmation that these conditions have been met.

Graduate School Representatives serving on a committee for a program that has been approved by the Graduate College to use an outcomes-based approach to assess doctoral student performance also have the responsibility to document that the process and assessment of the student's performance in the doctoral program match the defined program outcomes.

NOTE: Other qualified individuals may participate as committee members following approval by the graduate dean upon a recommendation accompanied by rationale and curriculum vitae by the appropriate program administrator and academic dean. The supervisory committee agreed upon by the major adviser and student, and approved by the program administrator and the academic dean shall be recommended to the Dean of the Graduate College for final approval.

Each committee member shall have an equal vote in committee decisions. The committee is to assist the student in the preparation of a plan of study and to advise him or her during the period of graduate work. The supervisory committee is encouraged to convene at least once per semester and meet at least once per year to review the progress of the student.

Plan of Study

The Plan of Study should be submitted to the Graduate College for approval at the end of the first year of graduate study and at least one month prior to scheduling the comprehensive/preliminary examination. Revisions may be made with the Request for Change form. Plans of Study, and all

changes to them, must be approved by the student, the supervisory committee, the graduate program leader of the student's program, and the Dean of Graduate Studies.

Each program has the responsibility of defining the requirements for a doctoral degree in its disciplinary area. This information should be made available to students on the website and in the program handbook. Students are responsible for familiarizing themselves with the requirements, rules, and recommendations.

Didactic Credit-Based Doctoral Degrees

Didactic credits are courses that are taught in a class setting by an instructor; they are numbered 601-689, 691; 700-789, 791; 800-889 and 891. A doctoral degree is made up of both didactic credits and non-didactic credits, such as practicums, seminars, or research credits. The 600 number range indicates a stacked undergraduate/graduate course, 700 and 800 are master's and doctoral level courses, and 800 courses are reserved for doctoral students only.

Bachelor's to Doctoral Degree

- Minimum of 90 graduate credits total for a PhD; minimum of 86 graduate credits for the DNP
- 27 of the 90 must be didactic credits
- 15 of the 27 didactic credits must be 700 or 800 level course work

Master's to Doctoral Degree

- Minimum of 60 graduate credits total
- Minimum of 45 credits total completed at NDSU
- 15 of the 60 credits must be 700-800 level or equivalent didactic courses
- Only 30 credits from a completed master's degree can be used as transfer credit except where expressly allowed by policy or transfer agreement; any additional graduate credits to be transferred to NDSU must have been earned as part of a doctoral program in the same or a meaningfully related discipline at another accredited doctoral institution.
- Specific programs may require completion of additional credits

Outcomes-Based Doctoral Degrees

Ph.D. programs using an outcome-based curriculum are not expected to include a minimum number of didactic credits. The total number of credits required for a degree is the same as didactic credit-based programs, but the credits can be earned through any credit-based academic activity.

Programs must have an approved statement of expected program outcomes and a strategy for measuring the desired outcomes. The program outcomes must include, but are not limited to:

1. Ability to synthesize information
2. Demonstrated ability to think critically
3. Effective written and oral communication skills
4. Mastery of major methods or analytical approaches of the field
5. Ability to contribute creatively to the discipline
6. Professional and ethical behavior standards consistent with the expectations of the discipline
7. Professional and workplace skills necessary to succeed in chosen career path

Changes in curriculum must be submitted through the proper curriculum approval channels (<https://www.ndsu.edu/facultysenate/acadaffairs/channels/>).

Transfer of Credit

All graduate credits used to meet the requirements of a doctoral degree must be approved by the supervisory committee, the graduate program leader, and the Dean of the Graduate School.

Bachelor's to doctoral students: The doctorate requires a minimum of 90 graduate credits (86 credit for the DNP). A minimum of 27 credits of didactic coursework are required; no more than 15 didactic credits may be transferred as part of the Plan of Study. All transfer credits for students with a bachelor's degree working toward a doctoral degree at NDSU:

- must be graduate-level course work from regionally accredited colleges or universities (or equivalent for international institutions) to be eligible for acceptance in transfer;
- must be approved in a Plan of Study by the supervisory committee, the graduate program leader, and the Dean of Graduate Studies;
- must not be courses graded Pass/Fail or Satisfactory/Unsatisfactory;
- must carry only grades of A or B on a 4-point scale;

- must have been earned no more than 10 years prior to graduation with a doctoral degree at NDSU
- must not be a continuing education, correspondence, extension, or workshop course;
- must not be internship, individual study, special problem, or research (disquisition) courses;
- must not have been used to fulfill the requirements of a previous baccalaureate or master's degree (with the exception of accelerated master's degrees);
- must be verified by an official transcript; and
- will not be used in calculation of the grade point average.

Master's to doctoral students: The doctorate requires a minimum of 60 credits beyond the master's degree; therefore, no more than 30 credits from a previously earned master's degree may be transferred into a doctoral program at NDSU, except where expressly allowed by policy or transfer agreement. The previous master's degree must be meaningfully related to the discipline in which a doctoral degree is pursued.

In addition to a maximum of 30 credits applied toward an earned master's degree, transfer of up to 15 credits from another doctoral program in the same or a meaningfully related discipline from an accredited doctoral institution can be allowed in individual cases, for a total of 45 transfer credits. Strict limitations apply. Approval from the supervisory committee, the graduate program leader, and the Dean of Graduate Studies is required as part of an approved Plan of Study.

All transfer credits in addition to the 30 for a prior master's degree for students working toward a doctoral degree at NDSU:

1. must be doctoral-level coursework in the same or a meaningfully related discipline from a doctoral program offered by a regionally accredited university (or equivalent for international institutions) to be eligible for acceptance in transfer;
2. must be approved in a Plan of Study by the supervisory committee, the graduate program leader, and the Dean of Graduate Studies;
3. must not be courses graded Pass/Fail or Satisfactory/Unsatisfactory;
4. must carry only grades of A or B on a 4-point scale;
5. must have been earned no more than 10 years prior to graduation with the doctoral degree at NDSU;
6. must not be a continuing education, correspondence, extension, or workshop course;
7. must not be internship, individual study, special problem, or research (disquisition) courses;
8. must be verified by an official transcript; and
9. will not be used in calculation of the grade point average.

Notes:

1. The petition for transfer of credits is part of the development process for the Plan of Study. Individual courses at the master's or doctoral level that have been accepted in transfer have to be listed in the transfer credit section of the Plan of Study, and they are to be counted toward the required credit total for the Plan of Study.

If 30 credits are accepted in transfer from a previously earned master's degree into a doctoral degree program, the accepted master's degree is listed in the header for the Plan of Study, and the Plan of Study lists only the required courses beyond the master's degree (for a minimum of 60 credits). If individual doctoral credits are accepted for a doctoral degree at NDSU, these additional courses need to be listed in the transfer credit section of the Plan of Study, and they are to be counted toward the required total for the Plan of Study.

2. It is the responsibility of the student to provide official transcripts of graduate courses taken elsewhere to the Graduate School.
3. Departments and programs have the right to further restrict or completely eliminate acceptance of transfer credits for their degree programs. Prospective students are encouraged to contact the respective academic department or the Graduate School for information on exceptions to this graduate credit transfer policy.

Time Limitation

Graduate credit for any coursework that is more than 10 calendar years old at the time of the final examination cannot be used to satisfy degree requirements unless a petition for exception was approved. The final examination is valid for one year. Should a student not have his/her disquisition approved by the Graduate School or fail to meet other degree requirements within that timeframe, the final examination must be retaken.

If a period of time two years or greater lapses before the disquisition is approved by the Graduate School, the student must reapply, re-defend the dissertation and must register for a minimum of two (2) credits. The student's degree will post at the end of the semester in which the disquisition is approved by the Graduate School.

IRB, IBC, and/or IACUC Approval

If a proposed graduate research project involves human, animal, or biohazard subjects, it must be submitted for review and approval by the Institutional Review Board (IRB), the Institutional Animal Care and Use Committee (IACUC), and/or the Institutional Biosafety Committee (IBC). This process should be initiated by the student after his or her supervisory committee has approved the final research design, because IRB, IBC, and/or

IACUC approval must be obtained **before** the research project commences and cannot be granted retroactively. A copy of the appropriate approval letters are to be included when the dissertation is submitted for editing.

Disquisitions that involve research using humans or animals as subjects or using biohazard materials will not be approved by the Graduate College if such research has not been previously approved by the Institutional Review Board (IRB), Institutional Animal Care and Use Committee (IACUC), or Institutional Biosafety Committee (IBC) as appropriate. Every effort should be made by advisers to ensure that students are aware of these University requirements.

Examinations

The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair.

A **comprehensive/preliminary examination** will be required of each student after the greater portion of courses has been completed. This examination consists of a written part and an oral part. After passing the comprehensive/preliminary examination, the student will be formally admitted to candidacy for the Doctor of Philosophy degree. At least one academic semester must elapse between the comprehensive/preliminary examination and the final examination.

The **final examination** will be taken after the candidate has completed the course work and dissertation. This oral examination will be concerned primarily with the dissertation, but it may also cover material from course work, especially those courses fundamental to the dissertation. The dissertation in a near final form must be given to the committee members at least seven (7) days prior to the final examination.

Once a date is finalized with the student's supervisory committee, the Notification of Scheduled Examination form (<https://powerforms.docusign.net/0abb6387-c124-45e6-bc80-337a7635ffb0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) must be filed with the Graduate College at least two (2) weeks prior to the examination.

At the conclusion of each oral examination, the examining committee shall record, in writing, its approval or disapproval of the candidate and file the appropriate report of examination form to the Graduate College within 14 days following the exam.

A negative vote by more than one member of the student's committee will signify failure of either the comprehensive/preliminary examination or the final examination. Upon permission of a majority of the supervisory committee members, a candidate is allowed to take each examination twice. The supervisory committee will set a date at least one month after the failed examination. Exception to this time limit will be considered by the Dean of the Graduate College upon presentation of written justification from the chair of the supervisory committee in consultation with the committee members. Should both attempts to pass an examination result in failure, the candidate may request to take the examination a third time. A request for a third examination requires the support of the supervisory committee and program administrator, and the approval of the Dean of the Graduate College after consultation with the Graduate Council.

Continuous enrollment is required (fall and spring semester) until all degree requirements are completed, including Graduate School approval of the dissertation. Students defending in the summer semester must register for credit.

To participate in commencement, the student must pass the final examination. Students who complete graduation requirements during the summer are eligible to participate in either May or December commencement ceremonies within the calendar year of their graduation. To participate in the May commencement exercises, students must be registered in the remaining graduation requirements for the summer session of the same year.

Dissertation Video

Doctoral students are required to submit a three-minute video summarizing their dissertation research for a lay audience. The video should be produced during the final semester of study (specific timing varies by program). Some programs require these videos to be shown to the supervisory committee at the time of final defense, while others do not. Students should consult with their adviser regarding program policies. At a minimum, a student cannot successfully produce the video until the results of his or her research are known.

Dissertation

The dissertation must show originality and demonstrate the student's capacity for independent research. It must embody results of research that constitute a definitive contribution to knowledge.

Filing the Dissertation

After the final examination, the student incorporates all revisions into the disquisition as required by the supervisory committee. Once the corrections are made, students must submit the following items to the Graduate School:

- signed approval page
- IRB/IACUC/IBC Compliance Notification
- disquisition
- disquisition processing fee

The student will have one (1) year from the date of the final examination to complete the Graduate School disquisition review process and all other degree requirements. Should the disquisition not receive final approval or any other degree requirements not be completed within this time limit, the student must repeat the final examination. If a period of time two (2) years or greater lapses before the final copies are submitted, the student must reapply to the Graduate College, retake the final examination, register for a minimum of two (2) credits and request an extension.

A degree posts at the end of the semester in which the disquisition is approved and other degree requirements are completed.

Graduate Certificate Policies

The goal of Graduate Certificate programs at NDSU is to provide course experiences that form a distinct knowledge or skill set identified as a named certificate.

Admission

Students who are currently in a degree program who wish to pursue a certificate program must complete the Add a Certificate to a Degree (<https://powerforms.docuSign.net/f3f9def4-ea91-4164-9e08-2e549196549f/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7&accountId=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) form available on the Graduate School webpage.

Applicants not currently in a degree program must:

1. Have a baccalaureate degree from an educational institution of recognized standing.
2. Provide official transcripts from each college or university in which they have been enrolled or are currently enrolled (including both undergraduate and graduate course work).
3. Be approved for admission by the program administrator hosting the graduate certificate program and by the Dean of the College of Graduate and Interdisciplinary Studies.
4. Provide a TOEFL (Test of English as a Foreign Language) or IELTS (International English Language Testing System) score equivalent to that needed for the degree programs in the unit. This is required of ALL applicants whose native language is not English.

*NOTE: Admission into a Graduate Certificate program does not guarantee admission into a graduate degree program nor imply the waiver of any requirements for admission into a graduate degree program. A separate application is required for admission to another degree granting program.

Completion

1. Only grades of C or higher will satisfy requirements for course completion. Cumulative GPA on all credits taken at NDSU must be 3.0 or better.
2. Candidates apply for certificate issuance using a form provided by the Graduate College.
3. Courses used to satisfy the Graduate Certificate program requirements cannot be older than seven (7) years at the time the certificate completion is verified.
4. Transcripts will list Graduate Certificate as the name of the completed certificate program.
5. Credits earned toward completion of a certificate also may be used toward the completion of a master's degree.

Origination and planning of each certificate will occur within Graduate Certificate program committees hosted by an academic program.

Interdisciplinary programs are encouraged to create certificate programs, and in such cases, primary contributors will be listed as host programs.

Administration of Certificates

The Graduate College oversees the administration of all graduate certificate programs.

1. Certificate programs may be housed in an academic department or be part of a graduate interdisciplinary program. The department chair or the program director may administer the certificate program or may designate a certificate program coordinator. The program coordinator will be responsible for all aspects of the program, including admission, student tracking, and signing the student's Verification of Certificate. Programs are encouraged to have a coordinating committee oversee program assessment, curriculum, and other matters. The student's Verification of Certificate form must be signed by at least two individuals associated with the program, such as the program coordinator and the chair or director. One of the individuals signing the Verification of Certificate form must be a full member of the Graduate Faculty.
 2. The program coordinator will provide outcome or descriptive information to the Graduate College that will establish and maintain a website to advertise and explain NDSU graduate certificate programs to potential candidates. The site will list admission requirements and courses for each certificate. The Graduate College must be sure that the site is updated at least annually.
 3. Since a certificate is not a degree track, federal Title IV student financial assistance and tuition waivers will not be available for certificate students.
 4. Current students may also pursue Graduate Certificate programs.
 5. Program administrators will monitor and report certificate completions in program reviews, annual reports, and other summative documents. Faculty should be given credit for certificate participation in merit/tenure considerations.
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Approval Process for Graduate Certificate Programs

The approval process will be the same as that of degree programs.

Signatures are required from:

1. Program administrator(s) of the host academic program(s)
2. College Curriculum Committee
3. Academic Dean
4. Graduate Council and Dean of the College of Graduate and Interdisciplinary Studies
5. University Academic Affairs Committee
6. Faculty Senate
7. State Board of Higher Education

Curriculum Development

1. Committees will develop programs with a minimum of eight (8)* credits in specific graduate-level courses which can be completed preferably within one year but no more than three years.
*Different certificates may have higher credit requirements.
2. Transfer credit may not be applied to a certificate program.

Graduate Assistantship Policy

Graduate assistants are typically full-time graduate students who participate in teaching, research, or administrative activities in exchange for financial support at North Dakota State University. Graduate assistantships contribute to student professional development with the primary purpose of assisting students in the successful completion of their academic program. Students placed on Academic Warning may retain their assistantship. Students placed on Probation may no longer receive an assistantship.

Graduate assistantships may be awarded outside of the student's home program. These assistantships require the continued approval of the graduate program administrator of the student's program, the student's adviser and the Dean of the College of Graduate and Interdisciplinary Studies.

Assistantship appointments may vary in length and are contingent upon the availability of funding. Some assistantships are granted for one academic term or year with reappointment dependent upon performance review. Other assistantships are granted for multiple years with annual performance reviews. A graduate assistantship can also involve research or teaching experiences conducted at an off-campus entity, such as a university, agency, or business. In these instances, the experience should be clearly linked to the student's program of study and involve a collaborative relationship between NDSU and the outside entity.

Fellowships may be awarded by NDSU or by an outside entity (e.g., a foundation, a government, etc.). Fellowships may require some specific activities, including work in a laboratory or teaching. If a fellowship includes specific activities, the guidelines established in this policy apply.

Eligibility for Assistantships

Recommendations for assistantships are made to the Dean of the College of Graduate and Interdisciplinary Studies and are subject to the dean's approval. Graduate programs may have specific requirements for eligibility.

Before any assistantship can be awarded, students must be admitted to the Graduate School as a degree-seeking student. The tuition waiver may be reduced by other financial awards directed specifically to pay tuition.

- Students must be registered for graduate credit each semester (fall and spring) they receive an assistantship, and must be in good academic standing and maintaining satisfactory progress toward their degree. In addition, international students must maintain the appropriate residency status.
- Teaching assistants whose native language is not English must demonstrate English proficiency (refer to section titled "English Language Proficiency Procedures for Graduate Teaching Assistants").
- Students offered a graduate teaching or graduate service assistantship must consent to a criminal background check.
- Students offered a graduate research assistantship who are responsible for, or with access to, controlled substances and other drugs, explosives or potentially dangerous chemicals and other substances, must consent to a criminal background check.
- Students placed on Academic Warning may retain their assistantship. Students placed on Probation may no longer receive an assistantship.

Expectations of Program/Assistantship Supervisor

Each graduate program must develop a procedure for the awarding of graduate assistantships. The Graduate College requires that a contract be provided to all graduate assistants. This document would specify expectations for the assistantship, including number of hours of work, stipend

amount, activities, etc. Programs/assistantship supervisors must provide periodic oral and written assessment and feedback regarding a graduate assistant's performance. This feedback should document areas where improvement is needed, and graduate assistants should be given adequate time to improve in those areas. Feedback should be provided annually at a minimum.

Expectations of Graduate Assistant

Students must dedicate the required number of hours assigned to work each week. Graduate assistants must work a minimum of 10 hours per week for 16 weeks, and must receive at least minimum wage. Graduate assistantships cannot exceed 20 hours per week. Students on full-time assistantships are generally discouraged from having additional off-campus employment.

Students receiving a graduate assistantship or fellowship are expected to maintain good academic standing and satisfactory progress toward their degrees. Please refer to the section on Graduate College Policies for more information.

Students receiving a graduate assistantship are expected to complete required trainings annually (e.g., Baseline Safety Training, Sexual Harassment Prevention Training, Title IX Training) within 30 days of accepting their appointment. Failure to complete training can lead to sanctions, including revocation of the tuition waiver and termination of the assistantship.

Students receiving a graduate assistantship are expected to fulfill their responsibilities adhering to the professional and academic expectations of their discipline and in compliance with NDUS and NDSU policies. Violations of these policies and expectations may result in sanctions, including loss of the assistantship and/or termination from the Graduate College. Adjudication of these violations will occur using NDSU Policy 335 (<https://www.ndsu.edu/fileadmin/policy/335.pdf>).

Students on research assistantships may also do related research for course credit. The number of hours of work per credit may vary depending on the discipline/department.

Stipend Levels and Tuition Waivers

Graduate assistantship stipends vary by discipline. A full-time assistantship consists of 20 hours/week. For information on the current minimum stipend level for a full assistantship, refer to graduate student handbooks for the specific department and/or departmental website information. Departments may award stipends of less than the full-time amount, but they must reduce the workload accordingly.

The responsibilities associated with a graduate assistantship may vary in nature. The hour commitment defined by an assistantship may be averaged across a given time period. For example, a teaching assistantship of 20 hours/week should total to 320 hours across the 16 weeks of the academic term. In these cases, students should be given adequate advance notice of these variable expectations so that they can adjust their schedules to meet the requirements of the assistantship. Supervisors must also remain sensitive to the academic demands faced by graduate students.

Students receiving graduate assistantships also receive tuition waivers to cover base tuition for regular NDSU graduate credits only. Students are responsible for any differential tuition, student fees, and tuition for other types of credits taken, such as undergraduate credits or Cooperative Education credits. To be eligible for a tuition waiver, the assistantship must be at least 160 hours per semester and must pay at least the federal minimum wage. Partial tuition waivers are not given when a graduate assistant works less than 160 hours in the semester. Students who, for any reason, do not complete a minimum of 160 hours in a given semester will not be eligible for that semester's waiver and will be billed for the tuition. The tuition waiver may have limitations depending on the assistantship appointment.

To be eligible for a summer tuition waiver, a student must have Graduate School approval and have received a tuition waiver for the preceding or following academic term (spring or fall semester). A tuition waiver will not be processed until a Graduate Summer Tuition Waiver form (<https://dmsforms.ndus.edu/iFiller/iFiller.jsp?fref=29bbd368-4c85-4043-a299-134ac5cd7534>) is received and approved by the Graduate School.

Students eligible for a graduate assistantship waiver may not also receive other NDSU tuition waivers. If a student is eligible for more than one waiver, the waiver which results in the highest tuition to be waived will be applied.

Additional Employment at NDSU or in the NDUS

Graduate assistants on full assistantships are not allowed to work on a second assistantship, as part-time instructors, as student workers, or in any other capacity for NDSU, any other campus in the North Dakota University System, or State of North Dakota agency or office while working as a graduate assistant, unless an exception is approved by the Dean of the College of Graduate and Interdisciplinary Studies **prior to the work being performed**.

Exceptions may be granted for up to six (6) additional hours (a total of no more than 26 total hours for the assistantship plus additional work). Additional work performed during the winter or spring breaks is allowed. Additional hours may also be appropriate during the summer term, depending upon the student's credit load for the summer term. Any of these exceptions must be recommended in writing by the student's supervisor, approved by the student's adviser and the student's department or program administrator, and forwarded to the Graduate College PRIOR to submission of the payroll form. The approval should then be attached to the payroll form. These steps must be completed in the order described and before the student begins work.

Rights and Privileges of Graduate Assistants

Graduate assistants have certain rights and privileges specific to the assistantship experience:

- The right to be notified in writing of all decisions that affect their status as a graduate assistant. This includes advance notification of evaluation procedures and a summary of their performance evaluation.
- The right to be notified of any complaints received by a supervisor or department chair concerning their performance of duties.
- The right to respond in writing to such complaints.
- The right, depending on the availability of departmental and university resources, to be supported in pursuing additional activities that pertain to their professional development.
- The right to balance their assistantship responsibilities with their responsibilities to their academic program so that they can complete their degree in a timely manner.
- The privilege of being treated as a professional in their chosen field of study.

Termination

Graduate assistants may have their assistantship terminated by the Dean of the College of Graduate and Interdisciplinary Studies, upon recommendation by their supervisor, with documentation of probable cause. Early termination for cause may occur when:

- A student does not abide by the appointment conditions.
- A student fails to perform tasks as assigned.
- A student does not make adequate degree progress.
- A student is placed on Academic Probation.
- A student does not make satisfactory research progress.
- A student fails to maintain minimum registration.
- A student persistently refuses to follow reasonable advice and counsel of faculty in carrying out assistantship obligations.
- A student fails to comply with responsibilities as an employee set forth in the *Graduate Bulletin*, department rules and regulations governing assistantships, or the terms of sponsored research agreements that fund the assistantship.
- A student's personal conduct is seriously prejudicial to the university, including violation of the NDSU Code of Student Behavior, state or federal law, and general university regulations.

Appeals Process

The North Dakota State University philosophy is to encourage and seek resolution of problems at the level most closely related to the origin of the specific disputes. This means:

- The first step should be an informal conference to first discuss and attempt to resolve the problem(s) with the person(s) directly involved.
- When a mutually satisfactory resolution cannot be reached or if discussion of the problem(s) seems inappropriate because of the nature of the student's complaint, the student should seek advice from the director of the program, chair of the department, or the graduate coordinator.
- Depending on the nature of the problem(s), the department chair or student's graduate committee chair may deal with the situation directly, advise the student to discuss the problem(s) with the appropriate academic dean and/or the Dean of the College of Graduate and Interdisciplinary Studies, or advise the student of the appropriate grievance procedure to pursue.
- If the graduate assistant wishes to challenge the termination decision, a written appeal to the Dean of the College of Graduate and Interdisciplinary Studies must be made within two weeks of notification of the mediation results (refer to section titled "Graduate Student Appeals").

Students should not carry more than a full-time load. Individual departments will determine a minimum and a maximum number of credit hours.

English Language Proficiency Procedure for Graduate Teaching Assistants

1. All students awarded a Graduate Teaching Assistantship (GTA) involving any type of teaching responsibility, including lectures, labs, or tutoring shall be evaluated with respect to overall communication proficiency during the 3rd week of the first semester of his or her teaching duties. While the format may be determined by individual units, the evaluation must be documented and it must address the comprehensive English proficiency of the teaching assistant, including speaking and listening ability, commensurate with his or her assigned duties. A copy of the evaluation instrument and the results for each teaching assistant shall be made available to the Graduate Dean upon request. In addition to the above evaluation, the following requirements must be met:
 - a. Graduate Teaching Assistants (who have direct contact with students) must have a minimum TOEFL iBT score of 81 (IELTS of 7; PTE Academic equivalent of 54), a TOEFL iBT Speaking subscale score of 23 or above and a TOEFL iBT Writing subscale score of 21 or above. The

IELTS equivalent scores are 6.0 for both, and the PTE Academic equivalent scores are 62 and 56, respectively. The Duolingo score is 115 or greater.

- b. Graders (who have no direct contact with students) must have a minimum TOEFL ibT score of 79 (IELTS of 6.5; PTE Academic of 53) and must score at or above the 40th percentile on the TOEFL ibT Speaking and Writing subscales (19 and 21, respectively). The IELTS equivalent scores are 5.5 and 6.0 respectively, the PTE Academic equivalent scores are 51 and 56, and the Duolingo is 110 or greater. Individuals may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the GTA requirements listed in the bullet point above OR successfully complete LANG 702, LANG 606, or LANG 704. Upon successful completion of 1) LANG 701, 2) a co-requisite graduate-level oral skills course, and 3) a Mock Teaching Exam designed in coordination with their department, students are qualified to be a GTA at NDSU.
2. Domestic GTAs and international GTAs possessing a US bachelor's degree or higher are not required to present a TOEFL score, provided that the degree included a minimum of two years in residence. In all other cases, the requirements in the bullets above apply.
3. International GTAs whose first language is not English and who do not meet the criteria in the bullet above must meet minimal requirements on measures of general English language proficiency, spoken English language proficiency, and written English language proficiency. At the present time, the accepted measure of language proficiency will be the TOEFL ibT, IELTS, PTE Academic or the Duolingo.

Test Score Requirements

Total Score

	Grader	Teaching Assistant
ibT	79	81
IELTS	6.5	7
PTE Academic	53	54
Duolingo	110	115

Speaking

	Grader	Teaching Assistant
ibT	19	23
IELTS	5.5	6.0
PTE Academic	51	62

Writing

	Grader	Teaching Assistant
ibT	21	21
IELTS	6.0	6.0
PTE Academic	56	56

Graduate Student Appeals

The philosophy of the Graduate College at North Dakota State University is to encourage and seek resolution of problems at the level most closely related to the origin of the specific disputes. This means:

1. the student is to first discuss the problem(s) with the person(s) directly involved;
2. if the student is not satisfied after discussing the problem with the person(s) directly involved or if discussion of the problem(s) seems inappropriate because of the nature of the student's complaint, the student should seek advice from the administrator of the program; and
3. depending on the nature of the problem(s), the program administrator or student's supervisory committee chair may deal with the situation directly, advise the student to discuss the problem(s) with the appropriate academic dean and/or the Dean of the Graduate College, or advise the student of the appropriate grievance procedure to pursue.

Areas of possible graduate student appeal include equal opportunity, suspension or dismissal from an academic program or the Graduate College, sanctions for academic dishonesty, and degree-acquisition processes that are unique to graduate education. The burden of proof by a preponderance of the evidence is on the graduate student making the appeal.

Equal Opportunity

North Dakota State University's general and specific commitment to being an equal opportunity institution is expressed elsewhere in this bulletin. As stated there, inquiries concerning compliance may be directed to the Vice Provost and Title IX Coordinator (201 Old Main, 701-231-7708, ndsuoaa@ndsu.edu) or to the Office for Civil Rights, U.S. Department of Education, 10220 N. Executive Hills Blvd., 8th Floor, 07-6010, Kansas City, MO 64153-1367.

Academic Evaluation

The University Senate Grade Appeals Board has the authority to hear charges of inequitable or biased academic evaluations and to provide redress for any improper evaluations as it may find to have actually taken place. This is for course grades assigned by instructors in charge of the courses. This includes grades of disquisition courses. The "Rights & Responsibilities of Community: A Code of Student Behavior," (<https://www.ndsu.edu/fileadmin/policy/601.pdf>) Section 337 of the NDSU Policy Manual, has the procedural details. Salient points repeated here are that the student must initiate a request for a change of grade with the instructor within 15 instructional days of the first day of the semester immediately following the semester in which the grade was awarded. During an actual appeal, the burden of proof is on the student. The Grade Appeals Board procedures are for student grievances against instructors over course grades assigned.

Academic Dishonesty

All other appeals are addressed through the Graduate College appeal process. These appeals may address suspension or dismissal from a graduate program or the Graduate College, sanctions for academic misconduct or dishonesty, and degree-acquisition processes that are unique to graduate education.

Procedures dealing with issues of academic dishonesty in meeting course requirements, such as cheating, plagiarism, or other academic improprieties brought by instructors against students enrolled in their course(s) or other NDSU course(s) or persons not enrolled at NDSU but viewed by the instructor as involved in the academic dishonesty are detailed in both the "Rights & Responsibilities of Community: A Code of Student Behavior" and Section 335 of the NDSU Policy Manual referenced in the preceding paragraph. A substantial range of penalties to the student(s) is available to the instructor(s) and academic dean(s) of the college(s) involved, i.e., the college offering the course(s) and the college of which the student(s) is (are) a member. One option available to the deans is to recommend suspension or expulsion from the university. A student may choose to appeal the assignment of a grade in a course in which academic misconduct has occurred to the Grade Appeals Board. The decision to impose any additional penalty or disciplinary sanction for prohibited academic conduct against a graduate student in meeting the requirements of either an undergraduate or graduate course may be appealed by said graduate student to a graduate student appeals committee, provided there is documentation in writing of consultation with instructor(s), program administrator(s), and dean(s), in sequence, to resolve the conflict. This appeal starts with a written notice to the Dean of the Graduate College. The written notice must be accompanied by the aforementioned documentation and must be received by the Dean of the Graduate College within two weeks of the most recent date on the documentation.

There are processes and activities that are intrinsic to the acquisition of a graduate degree. The processes include specification of degree requirements, preliminary and qualifying examinations, disquisition writing and approval, and possible suspension or dismissal from the program or the Graduate College. The activities for which faculty have primary responsibility include instructing students enrolled in courses; mentoring students; collecting, analyzing, and presenting for public consumption the subsequent results and conclusions; and possibly working with proprietary information. Problems in these areas are to be discussed with the chair of the graduate student supervisory committee and administrator of the program, in that order. Normally, these faculty members will attempt to work out a resolution of any problem by bringing the parties involved together in an informal, non-adversarial manner. Inquiry at this stage is usually limited to a determination of 1) whether the graduate student has been treated in an arbitrary or capricious manner or in some way not consistent with previously announced policy guidelines or 2) whether the graduate student has acted in a manner inconsistent with formal or traditional standards of academic conduct.

Conflicts not satisfactorily resolved at the program level are to be brought to the academic dean who will discuss the problem(s) with all interested parties. If resolution does not result at the academic dean level, an appeal can be brought to a graduate student appeals committee, as long as there is documentation in writing that the graduate student has consulted the graduate student's supervisory committee chair, the program administrator, and the academic dean in attempts to resolve the conflict. This appeal starts with a written notice to the Dean of the Graduate College. This written notice must be accompanied by the aforementioned documentation and must be received by the Dean of the Graduate College within six weeks of the most recent date on the documentation.

Graduate Student Appeals Committee

The Dean of the Graduate College is responsible for forming graduate student appeals committees and informing the committee members of their duties. The Dean of the Graduate College will serve as an ex-officio and nonvoting member. A graduate student appeals committee has five members, all of whom must be graduate faculty or currently enrolled graduate students. Four graduate faculty members will be selected at random from the membership of the Graduate Council. A graduate student member of the committee will be selected from a pool of graduate students that includes the student members of the Graduate Council and four students nominated by the Graduate Student Council (this pool will be created at the start of each academic year). The administrator(s) and dean(s) of the program(s) and college(s) involved cannot be members of the committee. The five committee members elect the chair of the committee from its membership. The graduate student and the party or parties against whom the complaint has been brought each have the right to challenge, with cause, to the Dean of the Graduate College one member of the graduate student appeals committee.

The burden of proof shall be with the appealing graduate student. The appealing graduate student has the right to 1) be given due notice in sufficient detail that the accusation is clear and the circumstances of the accusation are detailed enough for meaningful response by the accused and 2) be heard by an impartial body. Each contending party may, if it wishes, be accompanied by one counsel, but any counseling is restricted to 1) what to ask, 2) when not to respond to a question, and 3) how to answer a question. Counsel may not intrude on the hearing. The appeals committee is not bound by rules of legal evidence or procedure and may develop procedures that its members consider to be fair and equitable to the particular circumstance(s).

The chair of the committee will preside over the hearing. The hearing will include an opening statement by both the student and the party or parties against whom the complaint has been brought, questioning by the appeals committee, and brief closing statements by the student and the party or parties against whom the complaint has been brought.

Committee members make decisions on available information; non-response to questions is available information, i.e., a negative inference can be drawn from the lack of a response. The hearing will be closed unless the student signs a release waiving his or her rights to a closed hearing. The hearing, but not the appeals committee's deliberations, will be tape-recorded.

The decisions and recommendations of the appeals committee shall be by majority vote and will be advisory to the Dean of the Graduate College, who will then be responsible for taking appropriate action(s). Any further appeal shall be directed to the President of the University.

Colleges

College of Agriculture, Food Systems and Natural Resources (p. 998)

College of Arts, Humanities, and Social Sciences (p. 1004)

College of Business (p. 1011)

College of Graduate and Interdisciplinary Studies (<https://www.ndsu.edu/gradschool/>)

College of Engineering (p. 1014)

College of Health Professions (p. 1019)

College of Human Sciences and Education (p. 1023)

College of Science and Mathematics (p. 1029)

College of Agriculture, Food Systems and Natural Resources

www.ag.ndsu.edu/academics/

Academic programs in the College of Agriculture, Food Systems, and Natural Resources open doors to exciting and rewarding career and professional opportunities. Agriculture is the foundation upon which NDSU was established in the late 1800s. Today, the college builds on that tradition with teaching, research, and outreach that serves the interests of students and the needs of employers, fuels an economic engine critical to the United States, and improves the lives of people throughout the region and the world.

Mission and Values

The college provides relevant and challenging academic programs that prepare students to capitalize on current and future opportunities. Programs are based on fundamental sciences and technologies applied to agricultural life and environmental disciplines as well as related social and economic fields.

NDSU Agriculture, Food Systems and Natural Resources is taking its place as one of the nation's leaders. Our commitment to excellence has inspired new courses of study and has built ongoing partnerships with agricultural industries and government agencies.

Demand for graduates with expertise in the college's many disciplines continues to grow rapidly. Career opportunities for men and women are expanding into new areas made possible by new technologies and a more comprehensive global perspective.

Food safety and security, biotechnology and genetics, sustainable production and land stewardship, bio-energy and bio-products, and human/animal health are emerging national priorities. Our faculty are at the forefront of these and similar critical issues. Our students can engage their interests while gaining valuable hands-on learning experiences in the field, laboratories, and through interactions with business partners across the region.

Agricultural Education

NDSU is designated by the State Board for Career and Technical Education as the recognized institution for preparing teachers of Agricultural Education. While the degree program in Agricultural Education is offered by the College of Human Development and Education, students may pursue their degree in Agricultural Education by doing a major in General Agriculture (College of Agriculture, Food Systems and Natural Resources) and a degree in Agricultural Education (College of Human Development and Education). Pursuit of both majors should not increase the total number of credits needed to obtain the degree. Generally, students will start with the major in General Agriculture and add the major in Agricultural Education prior to requesting admittance into the Teacher Education program. The adviser in Agricultural Education will generally serve as the academic adviser from matriculation to completion so there is not a need to change advisers when the major in Agricultural Education is added. See the School of Education (p. 1050) section in this Bulletin under Agricultural Education for more information.

Interdisciplinary Studies and Affiliated Programs

The college contributes strongly to interdisciplinary studies in natural resources management, food safety, logistics management, and several graduate programs. A major in Agricultural and Biosystems Engineering is offered by the College of Engineering (p. 1014). The College of Human Sciences and Education (p. 1023) offers a major in Agricultural Education and the College of Arts, Humanities, and Social Sciences (p. 1004) offers a major in Agricultural Communication. These majors rely on the expertise and resources from the College of Agriculture, Food Systems, and Natural Resources.

Pre-Veterinary Medicine

NDSU offers excellent programs that prepare students for application to a college of veterinary medicine. All veterinary schools stress the importance of high scholastic standing and judge applicants on academic preparation, knowledge of the veterinary profession, experience and character.

Because the number of students admitted to veterinary schools is limited, prospective students should check the specific requirements of the college of their choice well in advance to make certain that preparatory work is appropriate.

Pre-veterinary medicine is not a specific major, and students are encouraged to pursue a major in their area of interest while at NDSU. In addition, students preparing for application to a veterinary school should consult with a pre-veterinary medicine advisor. Although a student may pursue a wide variety of majors while completing the pre-veterinary requirements, we recommend a major in Microbiology (p. 521) or Animal Science (p. 130) with the Animal Biomedical Sciences option.

Students who are admitted to and plan to enroll in a Veterinary Medical College prior to earning a baccalaureate degree from NDSU should consult with their academic adviser for options on transferring veterinary medicine credit back to NDSU to fulfill bachelor's degree requirements.

Graduate and Professional Schools

The college's academic programs are excellent preparation for continued formal education in graduate school programs and in professional schools offering degrees in business, law, medicine or veterinary medicine. For more information on graduate school opportunities at NDSU see the Graduate School (<https://www.ndsu.edu/gradschool/>) web site.

Scholarships

Students in the college who have selected one of the college's majors may be eligible for scholarships through their major department and/or the dean's office. Scholarships are awarded to students who have demonstrated excellence in their courses. About one-third of students in the college receive scholarships. Students are encouraged to contact their major department or the college web site for scholarship opportunities (<http://www.ag.ndsu.edu/academics/scholarships/>).

Student Organizations

Nearly 30 agriculture-related clubs and organizations (<http://www.ag.ndsu.edu/academics/student-organizations/>) provide opportunities for students to develop leadership, teamwork, interpersonal and communication skills.

Field Experience, Internships, Cooperative Education

Students gain practical experience and credits by enrolling in a supervised field experience (internship) offered through individual departments. Another option, offered by the Career Center (<https://www.ndsu.edu/career/>), provides undergraduate and graduate students with career-enhancing experiences and academic credits through the Cooperative Education program (<https://career.ndsu.edu/internship-program/>). The number of cooperative education credits allowed for graduation varies by program, but should not exceed six for any program in the college.

International Study

The college encourages students to gain international perspectives in their studies. Besides study abroad, students might consider adding the international studies major to their program in the college. Additional information is available from departmental offices or through the university's Office of International Student and Study Abroad Services (<https://www.ndsu.edu/international/>).

Agribusiness & Applied Economics (p. 1040)

Agriculture & Biosystems Engineering (p. 1040)

Animal Sciences (p. 1042)

Microbiological Sciences (p. 1061)

Plant Pathology (p. 928)

Plant Sciences (p. 1070)

School of Natural Resource Sciences (p. 1065)

Faculty

- Akyuz, F. Adnan, Professor of Climatological Practices, Ph.D., 1994, University of Missouri-Columbia
- Amat, Samat, Assistant Professor of Microbiological Sciences, Ph.D., 2019, University of Calgary
- Backer, Leslie F., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1972, North Dakota State University
- Baldwin, Thomas T., Assistant Professor of Plant Pathology, Ph.D., 2013, University of Georgia

- Bandillo, Nonoy B., Assistant Professor of Plant Sciences, Ph.D., 2016, University of Nebraska
- Banerjee, Samiran, Assistant Professor of Microbiological Sciences, Ph.D., 2012, University of Saskatchewan
- Bangsund, Dean, Research Scientist, M.S., 1987, North Dakota State University
- Bauer, Marc L., Associate Professor of Animal Sciences; Interim Department Head, Ph.D., 1996, University of Kentucky
- Berg, Eric P., Professor of Animal Sciences, Ph.D., 1996, Purdue University
- Berg, Erika L., Associate Professor of Animal Sciences, Ph.D., 2006, University of Missouri
- Berg, Paul T., Emeritus Associate Professor of Animal Sciences, Ph.D., 1975, North Dakota State University
- Berglund, Duane R., Emeritus Professor of Plant Sciences, Ph.D., 1971, North Dakota State University
- Berry, Eugene, Emeritus Associate Professor of Microbiological Sciences, Ph.D., 1983, Northeastern University
- Berti, Marisol T., Professor of Plant Sciences, Ph.D., 2007, North Dakota State University
- Biondini, Mario E., Emeritus Professor of Range Science, Ph.D., 1983, Colorado State University
- Boe, Arthur A., Emeritus Professor of Plant Sciences, Ph.D., 1966, Utah State University
- Boetel, Mark A., Professor of Entomology, Ph.D., 1996, South Dakota State University
- Bon, Thomas A., Associate Professor of Practice of Agricultural and Biosystems Engineering, Ph.D., 2003, North Dakota State University
- Borowicz, Pawel P., Research Assistant Professor, Ph.D., 2007, North Dakota State University, DVM, 2001, University of Agriculture, Lublin, Poland
- Brun, Lynn J., Emeritus Professor of Soil Science, Ph.D., 1972, Kansas State University
- Buchanan, David S., Professor of Animal Sciences; Associate Dean for Academic Programs, Ph.D., 1979, University of Nebraska-Lincoln
- Bullock, David, Research Associate Professor of Agribusiness and Applied Economics, Ph.D., 1989, Iowa State University
- Byrd, Christopher J., Assistant Professor of Animal Science, Ph.D., 2018, Purdue University
- Cai, Xiwen, Professor of Plant Sciences, Ph.D., 1998, Washington State University
- Cannayen, Igathinathane, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 1997, Indian Institute of Technology
- Carlson, Robert B., Emeritus Professor of Entomology, Ph.D., 1965, Michigan State University
- Casey, Francis X.M., Professor of Soil Science; Director of the School of Natural Resource Sciences; Associate Director of the NDAES, Ph.D., 2000, Iowa State University
- Caton, James, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2016, George Mason University
- Caton, Joel S., Enberg Professor of Animal Sciences, Ph.D., 1987, New Mexico State University
- Chatterjee, Amitava, Associate Professor of Soil Science, Ph.D., 2007, University of Wyoming
- Chen, Bingcan, Assistant Professor of Plant Sciences, Ph.D., 2012, University of Massachusetts, Amherst
- Christenson, Lisa A., Associate Professor of Practice of Animal Sciences; Co-Director of Veterinary Technology Program; D.V.M., 2003, University of Minnesota
- Christoffers, Michael J., Associate Professor of Plant Sciences, Ph.D., 1998, University of Missouri-Columbia
- Cihacek, Larry J., Professor of Soil Science, Ph.D., 1979, Iowa State University
- Condry, Danielle, Assistant Professor of Practice, Ph.D., 2013, University of North Dakota
- Cross, Harold Z., Emeritus Professor of Plant Sciences, Ph.D., 1971, University of Missouri
- Dahlen, Carl R., Associate Professor of Animal Sciences, Ph.D., 2009, University of Minnesota
- Dahnke, William C., Emeritus Professor of Soil Science, Ph.D., 1962, University of Wisconsin
- Dai, David W., Professor of Plant Sciences, Ph.D., 2001, North Dakota State University
- Daigh, Aaron, Associate Professor of Soil Science, Ph.D., 2013, Iowa State University
- Danielson, Russell B., Emeritus Associate Professor of Animal Sciences, M.S., 1973, North Dakota State University
- D'Appolonia, Bert L., Emeritus Professor of Cereal Science, Ph.D., 1968, North Dakota State University
- Deckard, Edward L., Professor of Plant Sciences, Ph.D., 1970, University of Illinois
- Deibert, Edward J., Emeritus Professor of Soil Science, Ph.D., 1976, University of Nebraska
- DeKeyser, Shawn, Professor of Range Science; Director of Natural Resources Management Interdisciplinary Program; Program Leader of Natural Resource Management, Ph.D., 2000, North Dakota State University
- del Rio Mendoza, Luis, Professor of Plant Pathology, Ph.D., 1999, Iowa State University
- DeSutter, Thomas M., Professor of Soil Science; Program Leader of Soil Science, Ph.D., 2004, Kansas State University
- Dexter, Alan G., Emeritus Professor of Plant Sciences, Ph.D., 1969, University of Illinois
- Disrud, Lowell A., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1969, Kansas State University
- Dodds, Duaine L., Emeritus Professor of Animal Sciences, M.S., 1966, North Dakota State University
- Dorsam, Glenn, Associate Professor of Microbiological Sciences, Ph.D., 1998, Virginia Commonwealth University
- Duysen, Murray E., Emeritus Professor of Plant Sciences, Ph.D., 1966, University of Nebraska
- Dyer, Neil W., Professor of Animal Sciences, D.V.M., 1991, Iowa State University
- Eck, Tate, Lecturer of Equine Science, B.S., 1996, North Dakota State University

- Elias, Elias M., University Distinguished Professor of Plant Sciences; J.F. Carter Durum Wheat Breeding/Genetics Endowed Professor, Ph.D., 1987, North Dakota State University
- Englund, David, Senior Lecturer of Agribusiness and Applied Economics, M.S., 1997, South Dakota State University
- Enz, John W., Emeritus Professor of Soil Science, Ph.D., 1976, University of Minnesota
- Erickson, Duane O., Emeritus Professor of Animal Sciences, Ph.D., 1965, North Dakota State University
- Fanning, Carl D., Emeritus Professor of Soil Science, Ph.D., 1965, University of Wisconsin
- Flaskerud, George, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., Florida State University
- Flores, Paulo, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2008, Federal University of Rio Grande do Sul
- Foster, Stephen P., Professor of Entomology, Ph.D., 1983, University of Waikato-New Zealand
- Franckowiak, Jerome D., Emeritus Professor of Plant Sciences, Ph.D., 1970, University of Wisconsin-Madison
- Franzen, David W., Professor of Soil Science; Extension Soil Specialist, Ph.D., 1993, University of Illinois
- Freeman, Thomas P., Emeritus Professor of Plant Pathology, Ph.D., 1968, Arizona State University
- Friskop, Andrew J., Associate Professor of Plant Pathology, Ph.D., 2013, North Dakota State University
- Frohberg, Richard C., Emeritus Professor of Plant Sciences, Ph.D., 1964, Iowa State University
- Gasch, Caley, Assistant Professor of Soil Science, Ph.D., 2013, University of Wyoming
- Geddes, Barney, Assistant Professor of Microbiological Sciences, Ph.D., 2014, University of Manitoba
- Gibbs, Penelope, Associate Professor of Microbiological Sciences, Ph.D., 2001, University of Georgia
- Giles, Joseph F., Emeritus Professor of Soil Science, Ph.D., 1974, Colorado State University
- Gill, Upinder, Assistant Professor of Plant Pathology, Ph.D., 2012, Washington State University
- Goos, R. Jay, Professor of Soil Science, Ph.D., 1980, Colorado State University
- Gordon, Dennis, Emeritus Professor of Cereal Science, Ph.D., 1974, University of Connecticut
- Grafton, Kenneth F., Emeritus Vice President, Emeritus Dean, Emeritus Professor of Plant Sciences, Ph.D., 1980, University of Missouri
- Gramig, Greta G., Associate Professor of Plant Sciences, Ph.D., 2006, University of Wisconsin-Madison
- Grazul-Bilska, Anna, Emeritus Professor of Animal Sciences, Ph.D., 1983, University of Agriculture and Technology, Olstyn, Poland
- Green, Andrew J., Assistant Professor of Plant Sciences, Ph.D., 2016, Kansas State University
- Grygiel, Carolyn E., Emeritus Professor of Practice of Range Science, Ph.D., 1983, Colorado State University
- Gudmestad, Neil C., University Distinguished Emeritus Professor of Plant Pathology, Ph.D., 1982, North Dakota State University
- Gustad, Thomas, Instructor; Microbiological Sciences, M.S., 1992, North Dakota State University
- Hammed, Ademola, Research Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2014, International Islamic University Malaysia
- Hammer, Carolyn J., Professor of Animal Sciences; Director of Equine Science, D.V.M., 2002, Iowa State University, Ph.D., 2003, Iowa State University
- Hanna, Lauren L.H., Associate Professor of Animal Sciences, Ph.D., 2013, Texas A&M University
- Hanson, Erik, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2016, University of Minnesota
- Hargiss, Christina L., Associate Professor of Natural Resources Management, Ph.D., 2009, North Dakota State University
- Harmon, Jason P., Associate Professor of Entomology; Associate Director of the School of Natural Resource Sciences Program Leader of Entomology, Ph.D., 2003, University of Minnesota
- Harris, Marion O., Emeritus Professor of Entomology, Ph.D., 1986, Michigan State University
- Harrold, Robert L., Emeritus Professor of Animal Sciences, Ph.D., 1967, Purdue University
- Hatterman-Valenti, Harlene, Professor of Plant Sciences; Assistant Department Head, Ph.D., 1993, Iowa State University
- Haugen, Ronald, Extension Farm Management Specialist, M.S., 1989, North Dakota State University
- Haugse, Clayton N., Emeritus Professor of Animal Sciences, M.S., 1958, North Dakota State University
- Hearne, Robert, Professor of Agribusiness and Applied Economics, Ph.D., 1995, University of Minnesota
- Hellevang, Kenneth, Professor of Agricultural and Biosystems Engineering, Ph.D., 1989, North Dakota State University
- Helms, Theodore C., Emeritus Professor of Plant Sciences, Ph.D., 1986, Iowa State University
- Herman, Dale E., Emeritus Professor of Plant Sciences, Ph.D., 1966, Purdue University
- Herren, R. Stanley, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1975, Duke University
- Hirning, Harvey J., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1970, Iowa State University
- Hoffman, Travis W., Assistant Professor of Animal Sciences, Ph.D., 2015, Colorado State University
- Hofman, Vernon L., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1969, North Dakota State University
- Hopkins, David G., Professor of Soil Science, Ph.D., 1997, North Dakota State University
- Horsley, Richard D., Professor of Plant Sciences; Department Head, Ph.D., 1988, North Dakota State University
- Hovick, Torre J., Assistant Professor of Range Science, Ph.D., 2014, Oklahoma State University

- Howatt, Kirk A., Associate Professor of Plant Sciences, Ph.D., 1999, Colorado State University
- Hughes, Harlan, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1971, University of Missouri
- Ikley, Joseph T., Assistant Professor of Plant Sciences, Ph.D., 2018, Purdue University
- Jackson, Jeremy, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2008, Washington University in St. Louis
- Jia, Xinhua, Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Arizona
- Johnson, Burton L., Professor of Plant Sciences, Ph.D., 1993, North Dakota State University
- Johnson, Carolyn R., Assistant Professor of Practice of Animal Science, D.V.M., 1986, Colorado State University
- Johnson, Robert L., Emeritus Professor of Animal Sciences, Ph.D., 1985, Iowa State University
- Johnson, Roger G., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1962, University of Minnesota
- Kalb, II, Thomas J., Extension Horticulture Specialist, Ph.D., 1988, Virginia Polytechnic Institute and State University
- Kandel, Herman (Hans) J., Professor of Plant Sciences, Ph.D., 1995, North Dakota State University
- Khan, Khalil, Emeritus Professor of Cereal Science, Ph.D., 1977, University of Manitoba, Winnipeg, Canada
- Khan, Mohamed, Professor of Plant Pathology, Ph.D., 1998, Clemson University
- Knodel, Janet J., Professor of Plant Pathology, Ph.D., 2005, North Dakota State University
- Koo, Won W., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1974, Iowa State University
- Kucera, Henry L., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1959, North Dakota State University
- Lakkakula, Prithviraj, Research Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2014, University of Florida
- Lardy, Gregory P., Professor of Animal Sciences; Vice President for Agricultural Affairs; Director of NDSU Extension; Director of ND Agricultural Experiment Station; Dean of College of Agriculture, Food Systems, and Natural Resources, Ph.D., 1997, University of Nebraska
- Lee, Chiwon W., Professor of Plant Sciences, Ph.D., 1977, Purdue University
- Leistriz, F. Larry, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1970, University of Nebraska
- Leitch, Jay H., Emeritus Professor of Natural Resources Management, Ph.D., 1981, University of Minnesota
- Li, Deying M., Professor of Plant Sciences, Ph.D., 2001, Iowa State University
- Li, Xuehui, Associate Professor of Plant Sciences, Ph.D., 2009, University of Georgia
- Lim, Siew Hoon, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2005, University of Georgia
- Limb, Ryan, Associate Professor of Range Science, Ph.D., 2008, Oklahoma State University
- Lin, Zhulu, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2003, University of Georgia
- Lindgren, Jon G., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1968, University of Missouri
- Lindley, James A., Emeritus Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1972, Purdue University
- Liu, Zhaohui, Associate Professor of Plant Pathology, Ph.D., 2006, North Dakota State University
- Lund, H. Roald, Emeritus Professor of Plant Sciences, Ph.D., 1965, Purdue University
- Lundstrom, Darnell R., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, University of Minnesota
- Lym, Rodney G., Emeritus Professor of Plant Sciences, Ph.D., 1979, University of Wyoming
- Maddock Carlin, Kasey R., Associate Professor of Animal Sciences, Ph.D., 2005, Iowa State University
- Maddock, Robert J., Professor of Animal Sciences, Ph.D., 2000, Texas A&M University
- Manthey, Frank A., Professor of Plant Sciences, Ph.D., 1985, North Dakota State University
- Marais, G. Francois, Professor of Plant Sciences, Ph.D., 1979, North Dakota State University, Ph.D., 1992, University of Stellenbosch-South Africa
- March, Raymond, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2017, Texas Tech University
- Marchello, Martin J., Emeritus Professor of Animal Sciences, Ph.D., 1968, Virginia Polytechnic Institute and State University
- Markell, Samuel G., Professor of Plant Pathology, Ph.D., 2007, University of Arkansas
- McClean, Phillip E., Professor of Plant Sciences, Ph.D., 1982, Colorado State University
- McEvoy, John, Professor of Microbiological Sciences, Ph.D., 2002, University of Ulster
- McGinnis, Esther E., Associate Professor of Plant Sciences, Ph.D., 2013, University of Minnesota
- McMullen, Marcia P., Emeritus Professor of Plant Pathology, Ph.D., 1983, North Dakota State University
- McMullen, Michael S., Professor of Plant Sciences, Ph.D., 1976, University of Minnesota
- Meehan, Miranda A., Assistant Professor of Animal Sciences, Ph.D., 2012, North Dakota State University
- Meinhardt, Steven, Associate Professor of Plant Pathology, Ph.D., 1984, University of Illinois-Urbana-Champaign
- Messersmith, Calvin G., Emeritus Professor of Plant Sciences, Ph.D., 1970, North Dakota State University
- Meyer, Dwain W., Emeritus Professor of Plant Sciences, Ph.D., 1970, Iowa State University
- Miljkovic, Dragan, Professor of Agribusiness and Applied Economics, Ph.D., 1996, University of Illinois
- Miranda, Carrie, Assistant Professor of Plant Sciences, Ph.D., 2018, University of Missouri
- Monono, Ewumbua, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2015, North Dakota State University

- Nahar, Nurun, Assistant Professor of Practice of Agricultural and Biosystems Engineering, Ph.D., 2017, North Dakota State University
- Nelson, Berlin D., Jr., Professor of Plant Pathology, Ph.D., 1979, Washington State University
- Nelson, Donald C., Emeritus Professor of Plant Sciences, Ph.D., 1961, University of Minnesota
- Nelson, William C., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1971, Ohio State University
- Nganje, William, Professor of Agribusiness and Applied Economics; Department Chair, Ph.D., 1998, University of Illinois
- Norland, Jack, Associate Professor of Natural Resources Management, Ph.D., 2008, North Dakota State University
- Novak, Blaine L., Lecturer of Animal Science, M. S., 2017, North Dakota State University
- Nowatzki, John F., Agricultural Machines Specialist in Agricultural and Biosystems Engineering, M.S., 1974, North Dakota State University
- Olhoft, Matt, Senior Lecturer of Agricultural and Biosystems Engineering, M.S., 1998, North Dakota State University
- Oliver, Rebekah E., Associate Professor of Practice in Plant Sciences, Ph.D., 2006, North Dakota State University
- Olson, Frayne, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2007, University of Missouri
- O'Relley, Z. Edward, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1972, University of Tennessee
- Osorno, Juan, M., Professor of Plant Sciences, Ph.D., 2006, North Dakota State University
- Ostby, Stacey M., Senior Lecturer of Veterinary Technology; Co-Director of Veterinary Technology Program; , M. Ed., 2018, North Dakota State University
- Parman, Bryon, Assistant Professor/Ag Finance Specialist of Agribusiness and Applied Economics, Ph.D., 2013, Kansas State University
- Pasche, Julie, Associate Professor of Plant Pathology & Neil C. Gudmestad Endowed Chair of Potato Pathology, Ph.D., 2012, North Dakota State University
- Peters, Thomas J., Associate Professor of Plant Sciences, Ph.D., 1990, North Dakota State University
- Petry, Timothy A., Associate Professor of Agribusiness and Applied Economics; Livestock Marketing Economist, M.S., 1973, North Dakota State University
- Prischmann-Voldseth, Deirdre A., Associate Professor of Entomology, Ph.D., 2005, Washington State University
- Pruess, Birgit, Professor of Microbiological Sciences, Ph.D., 1991, Ruhr Universitat Bochum Germany
- Pryor, Scott W., Professor of Agricultural and Biosystems Engineering, Associate Dean College of Engineering, Ph.D., 2005, Cornell University
- Rahman, Md. Mukhlesur, Associate Professor of Plant Sciences, Ph.D., 2007, University of Manitoba, Canada
- Rahman, Shafiqur, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Manitoba
- Ramamoorthy, Sheela, Associate Professor of Microbiological Sciences, Ph.D., 2006, Virginia Tech
- Ransom, Joel K., Emeritus Professor of Plant Sciences, Ph.D., 1982, University of Minnesota
- Rao, Jiajia, Assistant Professor of Plant Sciences, Ph.D., 2013, University of Massachusetts, Amherst
- Rao, Xudong, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2015, University of Minnesota-Twin Cities
- Rasmussen, Jack B., Professor of Plant Pathology; Department Head, Ph.D., 1987, Michigan State University
- Rathge, Richard W., Emeritus Professor of Agribusiness and Applied Economics and Sociology, Ph.D., 1981, Michigan State University
- Rayamajhee, Veeshan, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2019, University of Mexico
- Redmer, Dale A., Emeritus Professor of Animal Sciences, Ph.D., 1983, University of Missouri-Columbia
- Reff, Tommy L., Emeritus Professor of Agribusiness and Applied Economics, M.S., 1968, North Dakota State University
- Reynolds, Lawrence P., University Distinguished Professor of Animal Sciences, Ph.D., 1983, Iowa State University
- Rice, Billy B., Emeritus Professor of Agribusiness and Applied Economics, M.S., 1965, North Dakota State University
- Richman, Rachel, Senior Lecturer of Microbiological Sciences, M.S., 2002, University of Minnesota
- Rider, David A., Professor of Entomology, Ph.D., 1988, Louisiana State University
- Ripplinger, David, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2012, North Dakota State University
- Roberts, David, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2009, Oklahoma State University
- Robinson, Andrew P., Associate Professor of Plant Sciences, Ph.D., 2012, Purdue University
- Ross, Darrell, Professor of Entomology, Ph.D., 1990, University of Georgia
- Saxowsky, David M., Emeritus Professor of Agribusiness and Applied Economics, J.D., 1979, Ohio State University
- Scherer, Thomas, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1986, University of Minnesota
- Schroeder, J.W., Emeritus Associate Professor of Animal Sciences, Ph.D., 1999, North Dakota State University
- Schrupp, Jordan L., Lecturer of Veterinary Technology; Department of Animal Sciences, B.S., 2003, North Dakota State University
- Schuh, Jane, Professor of Microbiological Sciences; Vice-President for Research, Ph.D., 2000, North Dakota State University
- Schwarz, Paul B., Professor of Plant Sciences, Ph.D., 1987, North Dakota State University
- Sebesta, Steve, Foundation Seedstocks Director, M.S., 1982, Oklahoma State University
- Secor, Gary A., Professor of Plant Pathology, Ph.D., 1978, University of California-Davis
- Sedivec, Kevin K., Professor of Range Sciences; Interim Director of CGRECA, Ph.D., 1994, North Dakota State University
- Sharma, Anupa, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2016, Virginia Tech University

- Shetty, Kalidas, Professor of Plant Sciences; Associate VP for Global Outreach, Ph.D., 1989, University of Idaho
- Simsek, Halis, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2012, North Dakota State University
- Simsek, Senay, Professor; Bert L. D'Appolonia Cereal Science and Technology of Wheat Endowed Professorship, Ph.D., 2006, Purdue University
- Smith, Ronald C., Emeritus Professor of Plant Sciences, Ph.D., 1973, The Ohio State University
- Spilde, LeRoy A., Emeritus Associate Professor of Plant Sciences, Ph.D., 1975, North Dakota State University
- Stack, Robert W., Emeritus Professor of Plant Pathology, Ph.D., 1976, Cornell University
- Steele, Dean D., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1991, University of Minnesota
- Stegman, Earl C., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1965, Michigan State University
- Stokka, Gerald L., Associate Professor of Animal Sciences, D.V.M., 1982, Iowa State University
- Stoltenow, Charles L., Professor of Animal Sciences; Assistant Director and Agriculture and Natural Resources Program Leader for NDSU Extension Service, D.V.M., 1985, Iowa State University
- Sun, Xin (Rex), Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2013, Nanjing Agricultural University
- Swanson, Kendall C., Professor of Animal Sciences, Ph.D., 2000, University of Kentucky
- Swanson, Tara J., Senior Lecturer of Equine Science, M.S., 2014, North Dakota State University
- Thompson, Asunta (Susie) L., Associate Professor of Plant Sciences, Ph.D., 1998, University of Idaho
- Tilton, James E., Emeritus Professor of Animal Sciences, Ph.D., 1966, Oklahoma State University
- Vegi, Anuradha, Assistant Professor of Practice in Plant Sciences, Ph.D., 2008, North Dakota State University
- Venette, James R., Emeritus Professor of Plant Pathology, Ph.D., 1975, University of Minnesota
- Wachenheim, Cheryl, Professor of Agribusiness and Applied Economics, Ph.D., 1994, Michigan State University
- Wagner, Sarah A., Emeritus Professor of Animal Sciences, D.V.M., 1994, Michigan State University, Ph.D., 2003, Iowa State University
- Wahl, Thomas I., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1989, Iowa State University
- Ward, Alison K., Associate Professor of Animal Sciences, Ph.D., 2011, University of Saskatchewan
- West, Todd P., Professor of Plant Sciences; Assistant Dean, College of Agriculture, Food Systems and Natural Resources, Ph.D., 2004, Southern Illinois University
- Whited, Dean A., Emeritus Professor of Plant Sciences, Ph.D., 1967, North Dakota State University
- Wick, Abbey Foster, Associate Professor of Soil Science - Extension, Ph.D., 2007, University of Wyoming
- Wiesenborn, Dennis P., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, Rice University
- Wilson, William W., University Distinguished Professor of Agribusiness and Applied Economics, Ph.D., 1980, University of Manitoba, Canada
- Yan, Guiping, Assistant Professor of Plant Pathology, Ph.D., 2006, Washington State University
- Yonk, Ryan, Undergraduate Program Director, Ph.D., 2011, Georgia State University
- Youngs, Vernon L., Emeritus Professor of Cereal Science; USDA, Ph.D., 1965, North Dakota State University
- Zeleznik, Joseph, Extension Forestry Specialist, Ph.D., 2001, Michigan State University
- Zhang, Lei, Associate Professor of Agribusiness and Applied Economics, Ph.D., 2011, University of Texas at Dallas
- Zhang, Qi, Associate Professor of Plant Sciences, Ph.D., 2007, Kansas State University
- Zhang, Yu, Research Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2014, Nanjing Agricultural University
- Zhang, Zhao, Research Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2015, Pennsylvania State University
- Zhong, Shaobin, Professor of Plant Pathology, Ph.D., 2000, North Dakota State University
- Zollinger, Richard K., Emeritus Professor of Plant Sciences, Ph.D., 1989, Michigan State University
- Zuk, Alan J., Associate Professor of Plant Sciences, Ph.D., 2005, Kansas State University

College of Arts, Humanities and Social Sciences

www.ndsu.edu/ahss/

Our primary goal is preparing individuals for a rewarding career. We take pride in offering each student an insightful, innovative, and educational environment. We are proud that our degrees use innovative learning, research, and discovery to help each student reach their highest potential. Also, NDSU is one of the best values for a world-class education in the region in undergraduate and graduate education. The college is committed to:

- Providing students with hands-on learning and extracurricular experiences that will prepare them for meaningful work after college
- Cultivating an atmosphere that promotes intellectual rigor, critical inquiry, citizenship, and creative decision-making
- Enhancing the tradition of outreach through enriching performance, presentation, and cultural understanding in our communities
- Promoting the values of inclusion, integrity, and respect

Degree Programs

B.A. or B.S. Degree Programs

Students seeking a broad educational background may choose to complete requirements for either a Bachelor of Arts or Bachelor of Science degree in the following majors:

- Agricultural Communication
- Anthropology
- Architecture
- Art
- Art Education
- Criminal Justice
- Emergency Management
- English
- Environmental Design
- French
- History
- Journalism
- Management Communication
- Music
- Music Education
- Philosophy-Humanities
- Political Science
- Public History
- Sociology
- Spanish
- Strategic Communication
- Theatre Arts
- Women and Gender Studies

B.S.Arch. Degree

The Bachelor of Science in Architecture is granted after the fourth year of study in the Architecture program and typically is earned by students in pursuit of the professional Master of Architecture (<https://bulletin.ndsu.edu/programs-study/graduate/architecture/>) (MArch).

B.F.A. Degree

A Bachelor of Fine Arts degree is offered in the disciplines of Theatre Arts and Art.

B.Mus. Degree

A Bachelor of Music degree is available within the Challey School of Music (p. 525).

B.U.S. Degree

A Bachelor of University Studies degree is for students who are seeking a non-traditional, interdisciplinary education and wishing to tailor their own degree.

Graduate Degrees

Master's degrees are offered in Anthropology, Architecture, Communication, Emergency Management, English, History, Landscape Architecture, Music, and Sociology. Doctoral degrees are offered in Communication, Criminal Justice, Emergency Management, English, History, and Music. For more complete details, see the Graduate Bulletin (p. 733).

Teacher Certification

A Music Education option is offered under the B.Mus. degree in Music and an Art Education degree is available within the College of Arts, Humanities, and Social Sciences. Many of the other majors available through the College of Arts, Humanities and Social Sciences can lead to careers in teaching. Students who are interested in becoming professional educators should refer to the degree program offered through the School of Education. Teacher certification is available in the following areas: Art, English, French, History, Music, Social Science, and Spanish.

Students interested in teacher education are encouraged to declare a double major in their discipline and in education (i.e. History and History Education). Such double majors may typically be earned by successful completion of a few additional credits. Students should contact their advisers or the Office of Registration and Records for details.

Undergraduate Degree Requirements

All degree candidates must apply for graduation through the Office of Registration and Records (<https://www.ndsu.edu/registrar/>) according to university procedures and deadlines. Students should refer to the degree and graduation requirements (p. 63) section of this bulletin.

Bachelor of Science degree requirements includes completion of an approved minor. Bachelor of Arts degree requirements includes proficiency in one foreign language at the second-year college level. For more information on how to fulfill a B.A. requirement using a second language (p. 65), refer to the Academic Policies (p. 28) section of this bulletin.

Students in the college may take courses under the pass/fail option for free elective credits only, with a limit of 16 hours.

See College Requirements (p. 1006) for additional information on requirements that satisfy the college requirements.

Field Experience Courses

Departments may adopt either pass/fail or letter grade options for Field Experience/ Internships.

- Where Field Experience/Internship credits are a requirement of a program, these credits may be graded pass/fail to satisfy requirements for a major.
- Where Field Experience/Internship credits are not a requirement of a program, up to three credits may be graded pass/fail to satisfy requirements for a major.

Right of Petition

Students seeking deviation from any academic rules and regulations administered by the college may appeal in writing to the College's Committee on Student Progress. Pre-Professional Curricula Requirements for admission to most professional academic programs may be met at NDSU. The specific courses taken in a pre-professional program depend primarily upon the admission requirements of the program to which a student wishes to apply.

School of Design, Architecture, and Art (<https://www.ndsu.edu/sodaa/>)

Architecture (p. 1044)

Communication (p. 1048)

Criminal Justice (p. 1050)

Division of Performing Arts (<https://www.ndsu.edu/performingarts/music/>)

- Challey School of Music (p. 1064)
- Theatre Arts (p. 1074)

Emergency Management (p. 1054)

English (p. 1055)

History, Philosophy & Religious Studies (p. 1057)

Landscape Architecture (<http://bulletin.ndsu.edu/departments/landscape-architecture/>)

Modern Languages (p. 1063)

Political Science & Public Policy (p. 1071)

Sociology & Anthropology (p. 1073)

Visual Arts (<http://bulletin.ndsu.edu/departments/visual-arts/>)

Arts, Humanities and Social Sciences College Requirements

An additional 9 credits are required by the College of Arts, Humanities and Social Sciences for a student whose primary degree is a Bachelor of Science or Bachelor of Arts degree in a major from the College of AHSS. These additional 9 credits are not required for the Bachelor of Science in Architecture degree, Bachelor of Science degree with a major in Environmental Design, Bachelor of Fine Arts degree, Bachelor of Music degree, for any student whose primary major or degree is not in the College of AHSS, or the student is earning two majors or two different degrees.

Code	Title	Credits
AH&SS College Requirements		
Courses used to satisfy any general education requirement cannot be used to also count toward the AH&SS College Requirements. A minimum of three credits is required in each of the 3 following areas for a total of 9 credits. Choose only those courses with the prefixes listed for each area. A course with the WGS prefix can only be used in one area.		
Area One: Humanities		3
ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
Area Two: Social Sciences		3
ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Arts, Humanities, and Social Sciences

Degree Requirements

Bachelor of Science (B.S.) Degree – The completion of a minor program of study.

Bachelor of Arts (B.A.) Degree – Second year language proficiency at college level required.

Requirements for specialized degrees are listed with each major:

Bachelor of Architecture (B.S.Arch)

Bachelor of Fine Arts (B.F.A.) - available in Art, Design and Tech Theatre, Musical Theatre, or Performance

Bachelor of Music (B.Mus.)

Faculty

- Aly Ahmed, Bakr, Associate Professor of Architecture, M.Arch., 1990, Minia University, Egypt, Ph.D., 2002, Virginia Tech
- Ambrosio, Thomas, Professor of Political Science, Ph.D., 2000, University of Virginia
- Anderson, Gerald D., Emeritus Professor of History, Ph.D., 1973, University of Iowa
- Andrianova, Anastasiya, Associate Professor of English, Ph.D., 2011, The Graduate Center of the City University of New York
- Archbold, Carol A., Professor and Chair of Criminal Justice, Ph.D., 2002, University of Nebraska-Omaha
- Arnold, Lisa, Associate Professor of English, Director of First-Year Writing, Ph.D., 2011, University of Louisville
- Baggett, Ashley, Associate Professor of History and Director of Women and Gender Studies, Ph.D., 2014, Louisiana State University
- Barnhouse, Mark, Associate Professor of Practice of Architecture, M.Arch., 1988, Pratt Institute
- Barrett, Tracy C., Associate Professor of History, Ph.D., 2007, Cornell University
- Bauroth, Nicholas G., Associate Professor of Political Science, Ph.D., 2003, Loyola University
- Beck, Stephenson J., Professor and Head of Communication, Ph.D., 2008, University of Kansas
- Benton, Bradley, Associate Professor of History, Ph.D., 2012, University of California, Los Angeles
- Bergeson, Brady, Senior Lecturer of English, M.F.A., 2006, Hamline University
- Bertolini, Alison Graham, Associate Professor of English and Women and Gender Studies, Ph.D., 2009, Louisiana State University
- Bertolini, C. David, Dean and Professor of Architecture and Landscape Architecture, Ph.D., 2008, Temple University
- Blankenship, Anne, Associate Professor of Religious Studies, Ph.D., 2012, University of North Carolina at Chapel Hill
- Boldt, Ethan, Assistant Professor of Political Science, Ph.D., 2019, University of Georgia
- Bonfield, June P., Emerita Professor of English, Ph.D., 1969, University of Texas
- Boonstoppel, Sarah, Assistant Professor of Political Science, Ph.D., 2014, University of Maryland, College Park
- Bovard, Richard W., Emeritus Professor of English, Ph.D., 1973, University of Denver
- Brandel, Jennifer, Assistant Professor of Architecture, M.F.A., 2018, California College of the Arts
- Brekke, Jeremy, Associate Professor of Music, D.A., 2004, University of Northern Colorado
- Briggs, Steven, Associate Professor of Political Science, Ph.D., 2007, University of Nebraska at Omaha
- Bromley, Kimble A., Professor of Visual Arts, M.F.A., 1986, Southern Illinois University
- Brunton, Bill B., Emeritus Professor of Anthropology, Ph.D., 1974, Washington State University
- Bumgarner, Jeffrey, Professor of Criminal Justice, Ph.D., 2000, University of Minnesota

- Burnett, Ann, Emerita Professor of Communication, Ph.D., 1986, University of Utah
- Burns, Kelly, Assistant Professor of Music, D.M.A., 2018, University of North Carolina at Greensboro
- Burt, Sean, Assistant Professor of History and English, Ph.D., 2011, Texas Christian University
- Callens, Melissa Vosen, Associate Professor of Practice of Communication, Ph.D., 2010, North Dakota State University
- Cameron, Kelly, Senior Lecturer of English, Ph.D., 2011, Texas Christian University
- Carlson, Natalie Smith, Senior Lecturer of English, M.A., 2010, North Dakota State University
- Cavins, Jo Wana, Senior Lecturer of English, B.A., 1979, University of Evansville, Indiana
- Challey, Connor, Lecturer of Music, M.M., 2018, Colorado State University
- Christensen, Ryan, Lecturer of English, M.F.A., 2012, Minnesota State University-Moorhead
- Clark, Jeffrey T., Emeritus Professor of Anthropology; Ph.D., 1987, University of Illinois
- Collins, Ross F., Professor of Communication, Ph.D., 1992, University of Cambridge, Britain
- Cooley, Dennis R., Professor of Philosophy, Ph.D., 1995, University of Rochester
- Corwin, Patricia A., Senior Lecturer of Sociology, M.A., 1972, North Dakota State University
- Cox, John K., Professor of History, Ph.D., 1995, Indiana University
- Crawford, Elizabeth Crisp, Associate Professor of Communication, Ph.D., 2007, University of Tennessee, Knoxville
- Creese, John, Assistant Professor of Anthropology, Ph.D., 2011, University of Toronto
- Crutchfield, David, Associate Professor of Architecture, M.Arch., 2004, University of Texas
- Cwiak, Carol, Associate Professor of Emergency Management, J.D., 1995, Western State University
- Danbom, David B., Emeritus Professor of History, Ph.D., 1974, Stanford University
- Devine, Marc, Assistant Professor of Theatre Arts, M.F.A., 2013, Naropa University
- Disrud, Stephen, Lecturer of Intensive English Language Program, M.A., 2004, North Dakota State University
- Duda, Meghan, Assistant Professor of Art, M.F.A., 2012, University of North Dakota
- Emanuelson, Pamela E., Associate Professor of Sociology, Ph.D., 2008, University of South Carolina
- Engler, Mark, Associate Professor and Head of Theatre Arts, M.F.A., 1998, University of Wisconsin-Madison
- Faulkner, Don C., Emeritus Professor of Architecture and Landscape Architecture, M.Arch., 1975, University of Utah
- Fawcett, Erienne, Lecturer and Assistant Director of Women and Gender Studies, M.A., 2011, North Dakota State University
- Fellows, Kristen, Assistant Professor of Sociology and Anthropology, Ph.D., 2013, University of Pennsylvania
- Fier, Tiffany, Associate Professor of Theatre Arts, M.F.A., 2007, Purdue University
- Fischer, Dominic, Assistant Professor of Landscape Architecture, M.L.A., 2011, The Bernard and Anne Spitzer School of Architecture at the City College of New York
- Fischer, Heather, Lecturer of Architecture and Landscape Architecture, M.D.S., 2014, Boston Architectural College
- Flood, Anthony, Associate Professor of Philosophy, Ph.D., 2003, University of Oklahoma
- Fricker, Linda M., Senior Lecturer of English; Director of Advising & Student Support, C.A.S., 1986, Northern Illinois University
- Froelich, Andrew I., Emeritus Professor of Music, D.M.A., 1988, Michigan State University
- Gleye, Paul, Professor of Architecture and Landscape Architecture, Ph.D., 1983, University of California-Los Angeles
- Goldwyn, Adam, Associate Professor of English, Ph.D., 2010, Graduate Center of the City University of New York
- Gore, Amy, Assistant Professor of English, Ph.D., 2019, University of New Mexico
- Goreham, Gary A., Emeritus Professor of Sociology; Ph.D., 1985, South Dakota State University
- Groves, Robert W., Emeritus Professor of Music, Ph.D., 1981, University of Iowa
- Grueb, Charlott, Assistant Professor of Architecture and Landscape Architecture, M. Arch., 1992, Kunstakademie, Dusseldorf
- Hackerott, Caroline, Assistant Professor of Emergency Management, Ph.D., 2016, Oklahoma State University
- Hageman, Jeanne K., Associate Professor of French, Director of International Studies; Ph.D., 1991, University of Wisconsin-Madison
- Hanson-Dittmer, Louise, Lecturer of English, M.Ed., 1998, North Dakota State University
- Harvey, Mark, Professor and Head of History, Philosophy and Religious Studies; Ph.D., 1986, University of Wyoming
- Hassel, Holly, Professor of English, Ph.D., 2002, University of Nebraska-Lincoln
- Hatlen, Vincent, Emeritus Professor of Architecture and Landscape Architecture, M. Arch, 1963, University of Michigan
- Hawley, D. Carlton, Associate Professor of Spanish, Ph.D., 1999, University of Iowa
- Helgeland, John A., Emeritus Professor of History and Religion, Ph.D., 1973, University of Chicago
- Helstern, Linda, Emerita Professor of English, Ph.D., 2001, Southern Illinois University
- Holthaus, Mitchell, Lecturer of German, M.A., 2014, California State University

- Homan, Paul W., Emeritus Professor of French, Ph.D., 1988, University of Kansas
- Isern, Thomas D., Distinguished Professor of History, Ph.D., 1977, Oklahoma State University
- Jenkinson, Harold L., Emeritus Professor of Architecture and Landscape Architecture, M.Arch., 1972, University of Illinois
- Jensen, Jessica A., Associate Professor and Head of Emergency Management, Ph.D., 2010, North Dakota State University
- Johnson, Donald F., Assistant Professor of History, Ph.D., 2015, Northwestern University
- Johnson, Sigurd, Associate Professor of Music; Director of Athletic Bands, D.M.A., 1999, University of Memphis
- Johnston, Eunice, Senior Lecturer of English; Academic Advisor for English, M.A., 1982, North Dakota State University
- Jones, Robert J., Emeritus Professor of Music, D.M.A., 1991, University of Oklahoma
- Jung, Jessica, Assistant Professor of Theatre Arts, M.F.A., 2011, De Paul University
- Justitz, Gerritdina, Emerita Professor of History, Ph.D., 1996, University of California, San Diego
- Kapplinger, Kent, Emeritus Professor of Visual Arts, M.F.A., 1991, University of Iowa
- Kelley, Suzanne, Assistant Professor of Practice, Editor in Chief, North Dakota State University Press, Ph.D., 2010, North Dakota State University
- Keogh, Cassie, Assistant Professor of Music, D.M.A., 2015, University of Oklahoma
- Knight, Jeff, Assistant Professor of Visual Arts, M.F.A., 2009, Savannah College of Art and Design
- Kirkpatrick, Sarah, Assistant Professor of Emergency Management, Ph.D., 2013, North Dakota State University
- Kirkwood, Matthew J., Landscape Architecture Program Director and Associate Professor of Landscape Architecture, M.Des, 1993, Harvard University
- Klenow, Daniel J., Professor of Emergency Management, Ph.D., 1977, University of Notre Dame
- Kloberdanz, Timothy J., Emeritus Professor of Anthropology, Ph.D., 1986, Indiana University
- Krishnan, Ramakrishnan S., Emeritus Professor of English, Ph.D., 1981, University of Nebraska
- Kost, Jason, Professor of Practice of Landscape Architecture, M.U.D. and M.L.U., 2008, University of Colorado Denver
- Larew, Donald E., Emeritus Professor of Theatre Arts, M.F.A., 1969, University of Iowa
- Larson, Jamee, Senior Lecturer of English, M.F.A., 2013, Minnesota State University Moorhead
- Law, Bill, Assistant Director, Fine Arts; Lecturer of Music, M.A., 1994, Minnesota State University Moorhead
- Lemieux-Wottrich, Marianne, Assistant Professor of Music, D.M.A., 2012, Stony Brook University
- Lifton, Paul, Professor Emeritus of Theatre Arts, Ph.D., 1985, University of California, Berkeley
- Lindgren, H. Elaine, Emerita Professor of Sociology, Ph.D., 1970, University of Missouri
- Littlefield, Robert S., Emeritus Professor of Communication, Ph.D., 1983, University of Minnesota
- Lu, Shuning, Assistant Professor of Communication, Ph.D., 2019, University of Texas at Austin
- Lyons, Michael J., Emeritus Professor of History, Ph.D., 1969, University of Minnesota
- Mack, Kyle D., Associate Professor of Music, D.A., 1992, Ball State University
- Mahalingam, Ganapathy, Professor of Architecture, Ph.D., 1995, University of Florida
- Majdik, Zoltan P., Associate Professor of Communication, Ph.D., 2008, University of Southern California
- Martens, Steve C., Emeritus Professor of Architecture and Landscape Architecture, M.Arch., 1988, University of Minnesota
- Mataic, Dane, Assistant Professor of Sociology, Ph.D., 2018, Pennsylvania State University
- Matchie, Thomas F., Emeritus Professor of English, Ph.D., 1974, University of Wisconsin
- Maylath, Bruce, Professor of English, Ph.D., 1994, University of Minnesota
- McCall, Mary, Assistant Professor of English, 2017, Purdue University
- McDonald, Thomas D., Professor Emeritus of Criminal Justice, Ph.D., 1972, Southern Illinois University
- McEnery, Deona, Senior Lecturer of English, M.A., 2001, North Dakota State University
- Mejia, Robert, Assistant Professor of Communication, Ph.D., 2012, University of Illinois at Urbana-Champaign
- Melby, Benjamin, Senior Lecturer in English, M.A., 2006, Indiana University
- Miller, E. John, Professor of Music; Director, Division of Fine Arts, Ph.D., 1992, Northwestern University
- Miller, Jo Ann, Distinguished Professor of Music; Director of Choral Activities, D.M.A., 1989, Conservatory of Music, University of Cincinnati
- Miller, Michael M., Assistant Professor of Library Science; Germans from Russia Bibliographer, M.Ed., 1967, University of North Dakota, M.S., 1969, University of North Dakota
- Moe, Charlette, Assistant Professor of Music, D.M.A., 2008, North Dakota State University
- Monzingo, John E., Emeritus Professor of Political Science, Ph.D., 1976, Claremont Graduate School
- Moore, Jason, Lecturer of Environmental Design, M.F.A., 2005, University of Iowa
- Morris, Bradley, Senior Lecturer of Philosophy, M.A., 1992, University of Iowa

- Myer, Andrew, Associate Professor of Criminal Justice, Ph.D., 2010, University of Cincinnati
- Nelson, Kjersten R., Associate Professor of Political Science, Ph.D., 2009, University of Minnesota-Twin Cities
- Nelson, Paul E., Emeritus Professor of Communication, Ph.D., 1968, University of Minnesota
- Nichols, Cindy J., Senior Lecturer of English, M.F.A., 1981, University of Iowa
- O'Connor, Robert, Emeritus Professor of English, Ph.D., 1979, Bowling Green State University
- Okigbo, Charles, Emeritus Professor of Communication, Ph.D., 1982, Southern Illinois University
- Olfert, Warren D., Professor of Music; Director of Bands, Ph.D., 1992, Florida State University
- Olson, Robert W., Emeritus Professor of Music, D.M.A., 1973, University of Illinois
- Patnode, Matthew A., Professor of Music, D.M.A., 2000, Arizona State University
- Pearson, Carol, Emeritus Professor of Spanish; Chair, Department of Modern Languages; Ph.D., 1998, University of New Mexico
- Pearson, Judy C., Emerita Professor of Communication, Ph.D., 1975, Indiana University
- Peet, Howard D., Emeritus Professor of English, M.S., 1965, Moorhead State University
- Pemstein, Daniel, Associate Professor of Political Science, Ph.D., 2010, University of Illinois at Champaign-Urbana
- Perett, Marcela, Assistant Professor of History, Ph.D., 2009, The Medieval Institute, University of Notre Dame
- Peterson, Larry R., Emeritus Professor of History, Ph.D., 1978, University of Minnesota
- Platt, Carrie Anne, Associate Professor of Communication and Associate Dean, Ph.D., 2008, University of Southern California
- Pull, Mary E., Senior Lecturer of English; Associate Director of Center for Writers, M.A., 2003, North Dakota State University
- Query, Joy M., Emerita Professor of Sociology and Psychology, Ph.D., 1960, University of Kentucky
- Ramsay, Ronald L.M., Associate Professor of Architecture, M.Arch., 1992, University of Texas, Austin
- Rathge, Richard W., Emeritus Professor of Sociology and Agribusiness and Applied Economics; Ph.D., 1981, Michigan State University
- Richardson, B. Lou, Emerita Professor of Mass Communication, M.S., 1966, North Dakota State University
- Richardson, Gerald A., Emeritus Professor of Mass Communication, M.A., 1967, University of Washington
- Riley, Thomas J., Emeritus Professor of Anthropology, Ph.D., 1973, University of Hawaii
- Rubenstein, Ellen, Assistant Professor of Anthropology, Ph.D., 2012, Yale University
- Ryan, Anneli, Lecturer and Coordinator of Intensive English Language Program, M.S., 2012, Minnesota State University Moorhead
- Saar, Cynthia L., Senior Lecturer of French, M.A., 1980, Middlebury College
- Sandland, Julie A., Senior Lecturer of English, M.A., 1990, North Dakota State University
- Sassi, Enrico, Senior Lecturer of English, Director the Center for Writers, M.F.A., 1997, University of Alaska, Fairbanks
- Sassi, Kelly, Professor of English, Ph.D., 2008, University of Michigan
- Schwaen, Regin, M.A.A., Associate Professor of Architecture, M.Arch., 1992, Arkitektskolen i Aarhus, Denmark
- Shaw, Richard M., Emeritus Professor of English, Ph.D., 1985, Ball State University
- Sherman, William C., Emeritus Professor of Sociology, M.A., 1965, University of North Dakota
- Slobin, Kathleen, Emerita Professor of Sociology, Ph.D., 1991, University of California, San Francisco
- Smith, Angela, Associate Professor of History, Ph.D., 2011, Middle Tennessee State University
- Smith, Leretta, Lecturer of Sociology, Ph.D., 2006, South Dakota State University
- Stark, Andrew, Assistant Professor of Practice of Visual Arts, M.F.A., 2009, University of North Dakota
- Stichman, Amy J., Associate Professor of Criminal Justice, Ph.D., 2003, University of Cincinnati
- Stickney, Gwen, Associate Professor of Spanish, Chair of Department of Modern Languages; Ph.D., 2004, Indiana University, Bloomington
- Strand, Michael J., Professor, Department Head of Visual Arts, Director of the School of Design, Architecture, and Art, M.F.A, 1999, University of Nebraska, Lincoln
- Strandness, Jean, Emerita Professor of English, Ph.D., 1974, Michigan State University
- Sublett, Virginia, Emerita Professor of Music, D.M.A., 1997, University of California, San Diego
- Sullivan, Dale L., Emeritus Professor of English, Ph.D., 1988, Rensselaer Polytechnic Institute
- Swenson, David G., Associate Professor of Visual Arts, M.F.A., 1992, University of Minnesota
- Syvertson, Eric, Assistant Professor of Visual Arts, M.F.A., 2014, Minneapolis College of Art and Design
- Taylor, Adam P., Lecturer of Philosophy, Ph.D., 2013, SUNY at Buffalo
- Temanson, Kaye, Senior Lecturer of English, M.A., 2001, North Dakota State University
- Theile, Verena, Associate Professor of English, Ph.D., 2006, Washington State University
- Thompson, Kevin M., Professor of Criminal Justice, Ph.D., 1986, University of Arizona
- Tollefson, Wayne E., Emeritus Professor of Art, M.A., 1962, Michigan State University
- Trautwein, Charlotte G., Emerita Professor of Music, M.S., 1968, University of Illinois
- Urness, Cindy, Associate Professor of Architecture and Architecture Program Director, M.Arch., 1988, Pratt Institute

- Varland, Rooth, Professor of Theatre Arts, M.F.A., 1989, Northwestern University
- Visilia, Anna Maria, Assistant Professor of Landscape Architecture, Ph.D., 1996, University of Pennsylvania
- Walden, Justin, Associate Professor of Communication, Ph.D., 2013, Pennsylvania State University
- Ward, Steve A., Emeritus Professor of English, M.A., 1964, North Dakota State University
- Weber, Christina, Professor of Sociology, Ph.D., 2005, State University of New York-Buffalo
- Weber, Michael J., Professor of Music, A.Mus.D., 1990, University of Arizona
- Westerman, Catherine Kingsley, Associate Professor of Communication, Ph.D., 2008, Michigan State University
- Westerman, David, Associate Professor of Communication, Ph.D., 2007, Michigan State University
- Whitsel, Christopher, Associate Professor of Sociology and Chair of Sociology and Anthropology, Ph.D., 2009, Indiana University, Bloomington
- Wicktor, Emily, Assistant Professor of English, Ph.D., 2010, The University of Kansas, Lawrence
- Wing, Heath, Assistant Professor of Spanish, Ph.D., 2015, Texas Tech University
- Wischer, Stephen, Associate Professor of Architecture, M.F.A., M. Arch., 2004, University of Calgary
- Wottrich, Tyler, Associate Professor of Music, D.M.A., 2013, Stony Brook University
- Youngs, George A., Emeritus Professor of Emergency Management, Ph.D., 1981, University of Iowa
- Zeng, Cheng, Assistant Professor of Communication, Ph.D., 2018, University of Jyväskylä, Finland

College of Business

www.ndsu.edu/business

The College of Business is committed to providing students with a quality education in the functional areas of business, a systematic exposure to the global business issues they will face in their careers, and an introduction to applying the technologies that will be a part of their work life. In addition, students may choose elective courses that will help prepare them for careers in specific areas in which they have an interest.

Undergraduate majors offered are: Accounting, Business Administration, Finance, Management, Management Information Systems, Marketing, and Global Business (2nd major option - must be paired with a primary major). Academic minors are offered in Accounting, Business Administration, Entrepreneurship, Fraud Investigation, Logistics Management, and Management Information Systems. Undergraduate Certificates in Entrepreneurship, Finance, and Professional Selling are also available. The College of Business is accredited by AACSB International – The Association to Advance Collegiate Schools of Business.

Admission Requirements

Students who wish to pursue a degree in the College of Business at NDSU enroll as pre-major students upon selecting one of the six primary majors available (i.e., Accounting, Business Administration, Finance, Management, Management Information Systems, and Marketing). Pre-major students are eligible for admission into the professional program following the successful completion of pre-admission courses (i.e., ENGL 120, COMM 110, ECON 201 or ECON 202, MATH 144, and PSYC 111 or SOC 110) with a grade of 'C' or better, and a 2.5 cumulative grade point average (GPA).

Students must be admitted into the major program prior to enrolling in the advanced 300-400-level accounting, business administration, finance, management, management information systems, and/or marketing courses offered by the College.

The College of Business has specific policies on transfer course evaluations. The transfer of business related courses into the professional program is limited to credit earned at business programs accredited by AACSB International. Contact a professional advisor (https://www.ndsu.edu/business/current_students/advising/) in the College of Business for more information.

Degree Programs

The College of Business offers undergraduate majors leading to a Bachelor of Science degree. The Master of Business Administration, Master of Accountancy, Master of Science in Business Analytics, Master of Supply Chain Management, Master of Transportation and Urban Systems, and the Doctorate in Transportation and Logistics degrees, and all Graduate Certificates are described in the Graduate Bulletin (p. 733) online.

Degree Requirements

Students are required to complete the course requirements of one of the majors in the College of Business. Students follow the published curricula for the major program of study from the semester/year of entrance into that major in the College of Business until graduation, provided enrollment at NDSU has not been discontinued for more than one year. Students who change their major program of study are subject to meeting the curricular requirements in effect at the time the new major is declared.

Students must be accepted into the major prior to the completion of the last 30 credits in required 300-400 level College of Business courses.

Graduation from the College of Business requires students to also earn a grade of 'C' or better in all pre-admission courses, lower-division courses, and upper-division course requirements in the professional program (including all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives), unless otherwise stated for respective majors.

Students in the College of Business are responsible for monitoring their individual progress toward degree completion. Full time, professional academic advisors and faculty advisors are available to provide guidance and answer questions. Advisors are assigned alphabetically by last name. You can contact them here (https://www.ndsu.edu/business/current_students/advising/).

Course Requirements

Students must have a minimum cumulative grade point average of 2.5 and the successful completion of pre-admission courses with a grade of 'C' or better to enroll in 300-400 level courses in the College of Business. Students are required to earn a minimum grade of 'B' in ACCT 200, and ACCT 201, or the equivalent courses in transfer, to enroll in 300-400 level accounting courses.

Cooperative Education/Internships

Cooperative Education (<https://career.ndsu.edu/internship-program/>), a program of the Career Center (<https://www.ndsu.edu/career/>), offers undergraduate and graduate students an opportunity to integrate classroom study with paid, career-related work experience for academic credit. Work may be full or part time. A cooperative education experience may substantially improve students' employment opportunities after graduation. A cooperative education experience is one way to satisfy the practicum (internship) requirements described below for Accounting and Management Information Systems majors.

General College Academic Policies

1. The College of Business may consider granting transfer credit for upper level business courses from colleges that are accredited by AACSB International. Business courses from programs that do not hold AACSB International accreditation cannot be used for a major or a minor in the College of Business; such courses may be eligible for use as a free elective. The College of Business accepts a maximum of nine credits of non-NDSU 300- and 400-level business courses from AACSB programs with the approval of the department.
2. **Pre-approval** from the department head or chair is required to enroll in 300- and 400-level business courses at another AACSB accredited university or Tri-College University. Transfer courses with grades of 'D' are not accepted for ACCT 200, ACCT 201, other pre-admission or lower division requirements, and 300- and 400-level major requirements.
3. Students must have a minimum 2.50 institutional grade point average and have successfully completed the pre-admission courses to enroll in 300- and 400-level courses in the College of Business.
4. Students are required to earn a minimum grade of 'B' in ACCT 200 and ACCT 201, or the equivalent courses in transfer, to enroll in 300 and 400-level accounting courses.
5. College of Business courses completed in previous semesters are considered valid for degree requirements if taken within the previous ten (10) years. College of Business coursework taken before the ten year limit may be reviewed by the College of Business Student Progress Committee to determine its appropriateness to the current major requirements. Students majoring in the College of Business cannot minor in business administration.

Pre-Professional Program Requirements

College of Business Pre-Professional Requirements

Code	Title	Credits
The following courses must be completed with a grade of C or better and students must have a minimum cumulative GPA of 2.50 for admission into the professional program for all College of Business majors.		
COMM 110	Fundamentals of Public Speaking	3
ECON 201 or ECON 202	Principles of Microeconomics Principles of Macroeconomics	3
ENGL 120	College Composition II	3
MATH 144	Mathematics for Business *	4
PSYC 111 or SOC 110	Introduction to Psychology Introduction to Sociology	3

* MATH 144 is recommended but MATH 146 or MATH 165 will also be accepted.

Academic Departments

Accounting & Information Systems (p. 1039)

Management & Marketing (p. 1059)

Transportation, Logistics & Finance (p. 1075)

Faculty

- Al Asady, Ahmad, Assistant Professor of Management, Ph.D., 2020, Kent State University
- Andersen, Margaret, Emeritus Professor of Accounting, Ph.D., 1989, Indiana University
- Bahrami, Bahman, Emeritus Professor of Management, Ph.D., 1983, University of Nebraska, Lincoln
- Banerjee, Somnath, Assistant Professor of Marketing, Ph.D., 2015, University of Central Florida
- Bridgelall, Raj, Assistant Professor of Transportation and Logistics, Ph.D. North Dakota State University
- Brown, Paul R., CPA, Senior Lecturer of Management, MBA, 1989, North Dakota State University
- Bowlin, William, Emeritus Professor of Accounting, Ph.D., 1984, University of Texas at Austin
- Chai, Linlin, Assistant Professor of Marketing, Iowa State University
- Chen, Jun (Jeffrey), Assistant Professor of Finance, Ph.D., 2014, University of North Carolina at Charlotte, NC
- Clifton, James W., CPA, CFE, Assistant Professor of Accounting Practice, M.Acc., 1988, University of North Dakota
- DiFiore, Lindsey, CPA, Lecturer, M.Acc., North Dakota State University
- Dowdell, Thomas, Professor of Accounting; Chair, Department of Accounting and Information Systems, Ph.D., 2004, Temple University
- Eisele, C. Frederick, Emeritus Professor of Business Administration, Ph.D., 1971, University of Iowa
- Emerson, Nancy, CPA, Lecturer of Accounting, MAS, 1991, Northern Illinois University
- Froelich, Karen A., Emeritus Professor of Management, Ph.D., 1994, University of Minnesota
- Ganesh-Pillai, Rajani, Professor of Marketing, Ph.D., 2008, University of Central Florida
- Godavarthy, Ranjit Prasad, Assistant Professor of Transportation and Logistics, Ph.D., Kansas State University
- Hean, Oudom, Assistant Professor of Finance, Ph.D., 2020, The Ohio State University
- Hong, Michelle, Assistant Professor of Management, Ph.D., 2016, Virginia Tech
- Hong, Yongtao, Associate Professor of Accounting, Ph.D., 2008, Drexel University
- Hsu, Dan, Associate Professor of Management, Ph.D., Syracuse University
- Huang, Huichi, Assistant Professor of Accounting, Ph.D., Syracuse University, NY
- Huseynov, Fariz, Professor of Finance, Ph.D., 2009, University of Memphis
- Jones, Joseph M., Associate Professor of Marketing, Ph.D., 1994, University of Missouri-Columbia
- Klammer, Bonnie K., CPA, Emeritus Professor of Accounting, Ph.D., 1999, Virginia Commonwealth University
- Knoepfle, Terry W., Emeritus Associate Professor of Business Law, JD, 1981, University of North Dakota
- Lehmborg, Derek, Professor of Management; Director of the MBA Program, Ph.D., 2010, University of Western Ontario
- Li, Jin, Professor of Marketing, Ph.D., 2007, University of Alberta
- Lu, Pan, Associate Professor of Transportation and Logistics, Ph.D., North Dakota State University
- Macintosh, Gerrard, Emeritus Professor of Marketing, Ph.D., 1992, University of Nebraska-Lincoln
- Marineau, Joshua, Associate Professor of Management, Ph.D., 2012, University of Kentucky
- Mattson, Jeremy, Assistant Professor of Transportation and Logistics, Ph.D., North Dakota State University
- Motuba, Diomo, Assistant Professor of Transportation and Logistics, Ph.D., North Dakota State University
- Nordstrom, Onnolee A., Assistant Professor of Management, Ph.D., University of Alberta
- Pengnate, Supavich (Fone), Assistant Professor of Management Information Systems, Ph.D., 2013, Oklahoma State University, Stillwater, OK
- Petersen, Michael, CMA, CFM, Associate Professor of Accounting, Ph.D., 2002, University of Iowa
- Peterson, Tim, Chair, Department of Transportation, Logistics, and Finance; Professor of Management, Ph.D., 1988, Texas A&M University
- Riggins, Fred, Professor of Management Information Systems; Director of the Center for Enterprise Business Analytics, Ph.D., 1994, Carnegie Mellon University
- Routledge, Clay, Challey Professor of Management, Ph.D., 2005, University of Missouri - Columbia
- Schiebelhut, John H., Emeritus Professor of Business Administration, Ph.D., 1970, University of Oregon
- Smith, Andrea H., Senior Lecturer of Business Law, JD, 1996, University of North Dakota School of Law
- Stevens, Charles D., Professor of Management, Ph.D., 1998, University of Kansas
- Stockman, H. Donald, CPA, Emeritus Professor of Business Administration, M.S.B.A., 1965, University of North Dakota
- Szmerekovsky, Joseph, Professor of Transportation and Logistics; Associate Dean, Ph.D., 2003, Case Western Reserve University
- Tangpong, Chanchai, Department Chair, Department of Management and Marketing; Professor of Management, Ph.D., 2002, Southern Illinois University, Carbondale
- Thompson, Rachel, Assistant Professor of Accounting, Ph.D., 2017, University of Minnesota
- Tian, Ruilin, Professor of Finance, Ph.D., 2008, Georgia State University

- Tolliver, Denver, Director of Transportation and Logistics, Ph.D., Virginia Polytechnic Institute and State University
- Traub, Rodney D., Emeritus Associate Professor of Management, Ph.D., 1994, Purdue University
- Tulibaski, Katherine, Assistant Professor of Practice, Ph.D., 2015, North Dakota State University
- Uppala, Vishal, Assistant Professor of Management Information Systems, Ph.D., 2018, University of North Carolina at Greensboro
- Vachal, Kimberly, Associate Professor of Transportation and Logistics, Ph.D. George Mason University
- Wright, Newell D., Professor of Marketing, Ph.D., 1993 Virginia Tech
- Zhang, Limin, Associate Professor of Management Information Systems, Ph.D., 2005, University of Arizona
- Zhang, Wei, Professor of Finance, Ph.D., 2001, Syracuse University
- Zuber, Jill, CPA, Associate Professor of Accounting, Ph.D., 2007, University of Arkansas

College of Engineering

www.ndsu.edu/coe/

Vision

The College of Engineering will be the engineering college of choice for students, faculty and employers seeking to enhance society through leadership and innovation.

Mission

We prepare innovative problem solvers and create new knowledge to improve lives in North Dakota and beyond.

Departments

The departments include Agricultural and Biosystems Engineering, Civil and Environmental Engineering, Computer Science, Construction Management and Engineering, Electrical and Computer Engineering, Industrial and Manufacturing Engineering, and Mechanical Engineering. The departments of Aerospace Studies (Air Force ROTC) and Military Science (Army ROTC) report through the college for academic program requirements.

Accreditation

The facilities and engineering curricula of college programs are reviewed periodically by the appropriate accrediting agencies. The programs leading to the Bachelor of Science degrees in the following disciplines are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>: Agricultural and Biosystems Engineering, Civil Engineering, Computer Engineering, Construction Engineering, Electrical Engineering, Industrial Engineering and Management, Manufacturing Engineering, and Mechanical Engineering. The American Council for Construction Education (ACCE) reviews the facilities and curricula for the program leading to the Bachelor of Science in Construction Management. These organizations are recognized national accrediting agencies.

Admission Requirements

Applicants for admission must satisfy the general admission requirements of the university.

Selective Program Entry

Programs within the College of Engineering may have selective program entry requirements. Refer to the department program descriptions for respective selective criteria.

Recommended Preparation

College of Engineering programs encourage high school preparation in addition to the minimum core curriculum requirements. Prospective students will be best prepared if they complete four units of high school mathematics including two units of algebra, one unit of geometry, and one-half unit of trigonometry. Science courses should include one unit of physics and one unit of chemistry. Students whose high school credentials or entrance examinations show deficiencies in these subjects will be required to enroll in courses designed to remove such deficiencies and cannot expect to complete a program of study in the number of semesters indicated in the printed curricula.

Degree Programs

Undergraduate programs of study lead to the Bachelor of Science degree in the specific fields of agricultural and biosystems engineering, civil engineering, computer engineering, computer science, construction engineering, construction management, electrical engineering, environmental engineering, industrial engineering and management, manufacturing engineering, and mechanical engineering. The Computer Science department offers programs leading to either a Bachelor of Science or Bachelor of Arts degree. Some programs include a number of options for specialized study.

The college has developed its programs of study to provide an educational experience in keeping with the professions of engineering, computing, and construction management. The classrooms and laboratories are well equipped and every effort is made to keep them abreast of current technology.

Engineering program graduates successfully apply for registration as professional engineers after required periods of professional experience. Examinations of the North Dakota State Board of Registration for Engineers and Land Surveyors are available on-line. The Level I - Associate Constructor Certification Exam for American Institute of Constructors Certification Commission is offered each semester. All students are encouraged to take appropriate licensure examinations in the senior year.

All College of Engineering departments also have programs that lead to Master of Science and Doctor of Philosophy degrees. The Department of Computer Science also offers Master of Science and Doctor of Philosophy degrees in Software Engineering as well as a Master of Software Engineering degree. The Department of Construction Management and Engineering offers a Master of Science in Construction Management or a professional Master of Construction Management degree. The Master of Construction Management and Master of Software Engineering degrees are also available online. The graduate degrees are administered by The Graduate School and the College of Engineering. A number of graduate assistantships are available to students undertaking graduate study. For more complete details, see the Graduate Bulletin (p. 733).

Special Opportunities and Services

Special opportunities include the following:

- **General Program:** Students who are interested in engineering but have not chosen a specific program are advised within the College of Engineering until they declare a major. They will be advised to take basic courses in the first two semesters that will be generally appropriate to any engineering major. Students are encouraged to select a specific program as soon as possible before the end of their first year.
- **Interdisciplinary Program:** The Natural Resources Management program (<https://www.ndsu.edu/nrm/>) is available through the College of Agriculture, Food Systems, and Natural Resources, the College of Engineering, and the College of Science and Mathematics. The College also collaborates with the Environmental & Conservation Science Program (<https://www.ndsu.edu/ecs/>) (ECS).

Student Societies and Organizations

All students are eligible to join one or more of these organizations which are actively supported for the benefit of students in the related curricula:

- American Indian Science and Engineering Society
- American Institute of Aeronautics and Astronautics
- American Society of Agricultural and Biological Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- American Water Works Association/Water Environmental Federation
- Association for Computing Machinery
- Associated General Contractors
- Bison Robotics
- Cybersecurity Student Organization
- Engineers Without Borders
- Institute of Electrical and Electronic Engineers
- Institute of Industrial Engineers
- Institute of Transportation Engineers
- Materials Research Society
- National Association of Home Builders
- National Society of Black Engineers
- Society for the Advancement of Material and Process Engineering
- Society of Automotive Engineers
- Society of Manufacturing Engineers
- Society of Plastics Engineers, Inc.
- Society of Women Engineers
- Surface Mount Technology Association

Air Force ROTC sponsors the Bernard S. Bennison Squadron of the Arnold Air Society (AAS). This is a non-profit student service organization dedicated to furthering the purpose, traditions and concepts of the United States Air Force. These objectives are primarily met through community service projects.

Several national professional honor societies have chapters on the campus for which students with high academic attainments are eligible in their junior or senior years. Eligible students are selected for Tau Beta Pi from all engineering programs, Alpha Epsilon from agricultural and biosystems engineering, Eta Kappa Nu from electrical engineering, Alpha Pi Mu from industrial engineering, Sigma Lambda Chi from construction management

and engineering, Pi Tau Sigma from mechanical engineering, and Upsilon Pi Epsilon from computer science. Membership in these societies is a coveted honor and highly regarded in the professions.

Research

Research and development projects are administered by college staff responsible for general policies, publications, and cooperative relations with private and governmental agencies.

Cooperative Education

Cooperative Education (<https://career.ndsu.edu/internship-program/>), a program of the Career Center (<https://www.ndsu.edu/career/>), offers undergraduate and graduate students an opportunity to integrate classroom study with paid, career-related work experience for academic credit. Work may be full or part time. A Cooperative Education experience may substantially improve students' employment opportunities after graduation.

Aerospace Studies (Air Force ROTC) (p. 1039)

Agricultural & Biosystems Engineering (p. 1040)

Civil & Environmental Engineering (p. 1047)

Computer Science (p. 1049)

Construction Management & Engineering (<http://bulletin.ndsu.edu/departments/construction-management-engineering/>)

Electrical & Computer Engineering (p. 1053)

Industrial & Manufacturing Engineering (p. 1058)

Mechanical Engineering (p. 1061)

Military Science (Army ROTC) (p. 1062)

Faculty

- Ajmera, Beena, Assistant Professor of Civil and Environmental Engineering, Ph.D., 2015, Virginia Polytechnic Institute and State University
- Amiri, Ali, Assistant Professor of Practice of Mechanical Engineering, Ph.D., 2017, North Dakota State University
- Asa, Eric, Associate Professor of Construction Management and Engineering, Ph.D., 2002, University of Alberta
- Azami, Fardad, Professor of Mechanical Engineering, Ph.D., 2007, University of Toronto
- Banawi, Abdul-Aziz, Assistant Professor of Construction Management and Engineering, Ph.D., 2013, University of Pittsburgh
- Bezbaruah, Achintya, Associate Professor of Civil Engineering, Ph.D., 2002, University of Nebraska-Lincoln
- Bilen-Green, Canan, Vice Provost for Faculty Affairs, Professor of Industrial and Manufacturing Engineering, Ph.D., 1998, University of Wyoming
- Bon, Thomas A., Associate Professor of Practice of Agricultural and Biosystems Engineering, Ph.D., 2003, North Dakota State University
- Braaten, Benjamin, Professor of Electrical and Computer Engineering, Department Chair, Ph.D., 2009, North Dakota State University
- Cannayen, Igathinathane, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1997, Indian Institute of Technology
- Chaharsooghi, Farhad S., Assistant Professor of Electrical and Computer Engineering; Ph.D. 2016, University of Michigan
- Chu, Xuefeng, Professor of Civil Engineering, Ph.D., 2002, University of California-Davis
- Denton, Anne, Professor and Undergraduate Student Coordinator, Ph.D., 1996, University of Mainz
- Estevadeordal, Jordi, Associate Professor of Mechanical Engineering, Ph.D., 1996, University of Houston
- Farahmand, Kambiz, Professor of Industrial and Manufacturing Engineering, Ph.D., 1992, University of Texas-Arlington
- Flores, Paulo, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2008, Federal University of Rio Grande do Sul
- Gao, Zhili, Associate Professor of Construction Management and Engineering, Ph.D., 2004 Iowa State University
- George, Sumitha, Assistant Professor of Electrical and Computer Engineering; Ph.D. 2020, Pennsylvania State University
- Gladen, Adam, Assistant Professor of Mechanical Engineering, Ph.D., 2014, University of Minnesota
- Glower, Jacob, Professor of Electrical and Computer Engineering; Ph.D., 1988, Ohio State University
- Green, Roger, Associate Professor of Electrical and Computer Engineering, Ph.D., 1998, University of Wyoming
- Grewell, David, Professor of Industrial and Manufacturing Engineering; Department Chair, Ph.D., 2005, Ohio State University
- Hammed, Ademola, Research Assistant Professor of Agricultural and Biosystems Engineering, Ph.D. 2014, International Islamic University
- Hellevang, Kenneth J., Professor of Agricultural and Biosystems Engineering, Interim Department Chair, Ph.D., 1989, North Dakota State University
- Hu, Lan, Lecturer of Computer Science, MS, 2007, Utah State University
- Huang, Ying, Associate Professor of Civil Engineering, Ph.D., 2012, Missouri University of Science and Technology
- Iskander, Syeed, Assistant Professor of Civil and Environmental Engineering, Ph.D., 2019, Virginia Polytechnic Institute and State University

- Jang, Youjin, Assistant Professor of Construction Management and Engineering, Ph.D., 2017, Seoul National University.
- Jeong, Inbae, Assistant Professor of Mechanical Engineering, Ph.D., 2017, Korea Advanced Institute of Science and Technology, Republic of Korea
- Jia, Xinhua, Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Arizona
- Jiang, Long, Associate Professor of Mechanical Engineering; Ph.D., 2003, Nanyang Technological University
- Kahn, Dan, Lecturer of Computer Science, MS, 2015, University of Illinois
- Kallmeyer, Alan R., Professor of Mechanical Engineering; Department Chair, Ph.D., 1995, University of Iowa
- Karami, Ghodrattollah, Professor of Mechanical Engineering, Ph.D., 1984, Imperial College of Science and Technology, University of London
- Katti, Dinesh R., Professor of Civil Engineering; Ph.D., 1991, University of Arizona
- Katti, Kalpana, Distinguished Professor of Civil Engineering, Ph.D., 1996, University of Washington
- Kessler, Michael, Dean of the College of Engineering, Professor of Mechanical Engineering, Ph.D., 2002, University of Illinois
- Kong, Jun, Professor of Computer Science, Ph.D., 2005, University of Texas, Dallas
- Kotala, Pratap, Assistant Professor of Practice of Computer Science and Software Engineering Graduate Facilitator, Ph.D., North Dakota State University, 2015
- Krishnan, Sumathy, Professor of Mechanical Engineering, Ph.D., 1995, Indian Institute of Technology-Madras, India
- Latimer, Joseph, Lecturer of Computer Science, MBA, 1988, California Polytechnic State University
- Le, Trung, Assistant Professor of Civil and Environmental Engineering, Ph.D., 2011, University of Minnesota
- Le, Trung (Tim), Assistant Professor of Industrial and Manufacturing Engineering; Ph.D., 2013, Oklahoma State University
- Li, Jen, Professor of Computer Science, Ph.D., 2008, University of British Columbia
- Lima, Ivan, Associate Professor of Electrical and Computer Engineering, Ph.D., 2003, University of Maryland
- Lin, Wei, Associate Professor of Civil Engineering, Ph.D., 1992, New York State University-Buffalo
- Lin, Zhibin, Associate Professor of Civil Engineering, Ph.D., 2010, University of Wisconsin-Milwaukee
- Lin, Zhulu, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2003, University of Georgia
- Liu, Lu, Assistant Professor of Computer Science, Ph.D., 2017, University of Texas at San Antonio
- Ludwig, Simone, Professor of Computer Science and Interim Department Chair, Ph.D., 2004, Brunel University
- Maassel, Michael, Visiting Assistant Professor of Electrical and Computer Engineering, Ph.D., 2013, North Dakota State University
- Magel, Kenneth, Professor of Computer Science, Ph.D., 1977, Brown University
- Malik, M. Zubair, Assistant Professor of Computer Science, Ph.D., 2014, University of Texas at Austin
- Monono, Ewumbua M., Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2015, North Dakota State University
- Myronovych, Oksana, Associate Professor of Practice of Computer Science, Ph.D., 2009, North Dakota State University
- Nahar, Nurun, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2017, North Dakota State University
- Narayanan, Lokesh, Assistant Professor of Industrial and Manufacturing Engineering; Ph.D., 2019, North Carolina State University
- Nawarathna, Dharmakeerthi, Associate Professor of Electrical and Computer Engineering, Ph.D., 2005, University of Houston
- Nazari, G. H., Lecturer of Mechanical Engineering, Ph.D., 1977, Texas A&M University
- Pieri, Robert V., Professor of Mechanical Engineering, Ph.D., 1987, Carnegie-Mellon University
- Pryor, Scott W., Associate Dean for Undergraduate Programs, Professor of Agricultural and Biosystems Engineering, Ph.D., 2005, Cornell University
- Radermacher, Alex, Lecturer of Computer Science, MS, 2012, North Dakota State University
- Rahman, Shafiqur, Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Manitoba
- Salem, Saeed, Associate Professor of Computer Science and Graduate Coordinator, Ph.D., 2009, Rensselaer Polytechnic Institute
- Scherer, Thomas F., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1986, University of Minnesota
- Selekw, Majura, Associate Professor of Mechanical Engineering, Ph.D., 2001, Texas A&M University
- Srinivasan, Sudarshan, Associate Professor of Electrical and Computer Engineering, Ph.D., 2007, Georgia Institute of Technology
- Steele, Dean D., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1991, University of Minnesota
- Steward, David, Professor and Chair of Civil and Environmental Engineering, Ph.D., 1996, University of Minnesota
- Stone, Matthew, Assistant Professor of Construction Management and Engineering, Ph.D., 2013, University of Alabama
- Straub, Jeremy, Assistant Professor of Computer Science, Ph.D., 2016, University of North Dakota
- Sun, Dali, Assistant Professor of Electrical and Computer Engineering; Ph.D. 2015, The University of Tokyo
- Sun, Xin, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2013, Nanjing Agricultural University
- Suzen, Bora, Associate Professor of Mechanical Engineering, Ph.D., 1998, Wichita State University
- Tangpong, Annie, Associate Professor of Mechanical Engineering, Ph.D., 2006, Carnegie Mellon University
- Tida, Umamaheswara R., Assistant Professor of Electrical and Computer Engineering; Ph.D. 2019, University of Notre Dame
- Ubhaya, Vasant, Professor of Computer Science, Ph.D., 1971, University of California-Berkeley

- Ulven, Chad, Professor of Mechanical Engineering, Ph.D., 2005, University of Alabama-Birmingham
- Vold, Jessica, Assistant Professor of Mechanical Engineering, Ph.D., 2015, North Dakota State University
- Wang, Danling, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2014, 2003, University of Washington, Peking University
- Wang, Xinnan, Associate Professor of Mechanical Engineering, Ph.D., 2008, University of South Carolina
- Wang, Yechun, Associate Professor of Mechanical Engineering, Ph.D., 2007, University of Maryland
- Wu, Di, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2011, Polytechnic University of Turin, Italy
- Wu, Xiangfa, Professor of Mechanical Engineering, Ph.D., 2003, University of Nebraska-Lincoln
- Xia, Wenjie, Assistant Professor of Civil and Environmental Engineering, Ph.D., 2016 Northwestern University
- Xu, Yiwen, Assistant Professor of Industrial and Manufacturing Engineering, Ph.D., 2015, University of Arizona
- Yadav, Om P., Professor of Industrial and Manufacturing Engineering, Ph.D., 2002, Wayne State University
- Yan, Changhui, Professor of Computer Science, Ph.D., 2005, Iowa State University
- Yang, Huojun, Assistant Professor of Construction Management and Engineering, Ph.D., 2012, University of Nebraska-Lincoln
- Yang, Mijia, Associate Professor of Civil Engineering; Ph.D., 2005, University of Akron
- Yellavajjala, Ravi Kiran, Assistant Professor of Civil Engineering, Ph.D., 2014, University of Notre Dame
- Yodo, Nita, Assistant Professor of Industrial and Manufacturing Engineering, Ph.D., 2017, Wichita State University
- Yu, Yao, Assistant Professor of Construction Management and Engineering, Ph.D., 2014, North Carolina A&T State University
- Zhang, Yan, Assistant Professor of Mechanical Engineering, Ph.D., 2013, Iowa State University
- Zhang, Yu, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2014, Nanjing Agricultural University
- Zhang, Qifeng, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2001, Peking University
- Zhang, Zhao, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2015, Pennsylvania State University

Emeritus

- Andersen, Donald A., Emeritus Professor of Civil Engineering, Eng.D., 1982, Texas A&M University
- Backer, Leslie, Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1972, North Dakota State University
- Bares, William A., Emeritus Professor of Electrical Engineering, Ph.D., 1968, University of Wyoming
- Disrud, Lowell, Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1969, Kansas State University
- Ewert, Dan, Professor of Electrical and Computer Engineering, Ph.D., 1989, University of North Dakota
- Goplen, Sherman P., Emeritus Associate Professor of Mechanical Engineering, Ph.D., 1977, Texas A&M University
- Henderson, Allen J., Emeritus Professor of Industrial and Manufacturing Engineering, Ph.D., 1968, Iowa State University
- Hirning, Harvey, Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1970, Iowa State University
- Hofman, Vernon, Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1969, North Dakota State University
- Isgrig, Elvin, Emeritus Professor of Industrial and Manufacturing Engineering, M.S., 1983, North Dakota State University
- Knudson, Dean, Emeritus Professor of Computer Science, Ph.D., 1972, Northwestern University
- Kirschenman, Merlin D., Emeritus Associate Professor of Construction Management and Engineering, M.S., 1976, University of California-Berkeley
- Krause, Daniel J., Emeritus Professor of Electrical and Computer Engineering, Ph.D., 1972, Colorado State University
- Kucera, Henry L., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1959, North Dakota State University
- La Palm, George L., Emeritus Professor of Civil Engineering, Ph.D., 1968, Purdue University
- Li, Kam, Emeritus Professor of Mechanical Engineering, Ph.D., 1965, Oklahoma State University
- Lindley, James A., Emeritus Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1972, Purdue University
- Lundstrom, Darnell R., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, University of Minnesota
- Marinov, Val, Emeritus Professor of Industrial and Manufacturing Engineering, Ph.D., 1992, Technical University of Sofia, Bulgaria
- Nygard, Ken, Emeritus Professor of Computer Science, Ph.D., 1978, Virginia Polytechnic Institute and State University
- Padmanabhan, G., Emeritus Professor of Civil Engineering, Ph.D., 1980, Purdue University
- Pestes, Michael N., Emeritus Professor of Mechanical Engineering, M.S., 1959, North Dakota State University
- Peterson, Donald E., Emeritus Associate Professor of Electrical Engineering, M.S., 1958, North Dakota State University
- Rieder, William G., Emeritus Professor of Mechanical Engineering, Ph.D., 1971, University of Nebraska-Lincoln
- Rogers, David A., Emeritus Professor of Electrical and Computer Engineering, Ph.D., 1971, University of Washington
- Smith, Gary, Dean Emeritus of the College of Engineering, Professor Emeritus of Construction Management and Engineering, Ph.D., 1986, Purdue University
- Stegman, Earl C., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1966, Michigan State University
- Stanislaw, Joseph, Emeritus Professor of Industrial and Manufacturing Engineering, Eng.Sc.D., 1970, Columbia University
- Stuehm, Donald L., Emeritus Professor of Electrical and Computer Engineering, Ph.D., 1972, Colorado State University

- Wiesenborn, Dennis P., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, Rice University
- Ziejewski, Mariusz, Emeritus Professor of Mechanical Engineering, Ph.D., 1986, North Dakota State University

College of Health Professions

www.ndsu.edu/healthprofessions/

The core mission of the College is to prepare students to become competent, caring, ethical professionals and citizens committed to lifelong learning.

The College of Health Professions (CHP) has been a center of excellence at North Dakota State University (NDSU) for more than 100 years. The College, a major academic unit of North Dakota State University, serves the state, region, and nation through its programs in pharmacy, nursing, medical lab science, respiratory care, radiologic science, health services, and public health. CHP provides education, research, patient care, public service, and is currently the largest health professions training program in North Dakota.

Through its mission, the NDSU College of CHP advances health care through research and scholarship and prepares students to become competent, caring, ethical, professionals and citizens, committed to lifelong learning. In addition, through its people and programs the College places an emphasis and value on people; quality; professionalism and ethics; knowledge, teaching, and learning; research and scholarship; patient-focused care; and interprofessional education.

Academic Units

The College, established in 1902, consists of four academic units involving six health professions disciplines: (1) the NDSU School of Pharmacy which has two departments including pharmacy practice and pharmaceutical sciences which are the founding members of the College; (2) the School of Nursing joined the College in 1969 as an associate degree program, 1986 as a baccalaureate degree program, 2005 with a doctor of nursing practice, and 2014 NDSU Nursing at Sanford Health site in Bismarck; (3) the Department of Allied Sciences (Medical Laboratory Science, Respiratory Care, and Radiologic Sciences with three unique specializations including radiography, echocardiography, and diagnostic sonography) joined the College in 2006; and (4) the Department of Public Health which joined the College in 2012. The Bachelor of Science in Health Services is inter-professional in nature, and is coordinated through the Office of the Dean.

Degree Programs

The College of Health Professions offers undergraduate academic programs in Pharmacy, Nursing, Medical Laboratory Science, Respiratory Care, and Radiologic Sciences. Admission requirements, curricula and degree titles differ for the programs.

The pharmacy curriculum consists of pre-pharmacy curriculum and then a four-year professional program leading to the Pharm.D. degree. Graduates are qualified to apply for licensure as pharmacists. In addition, Pharm.D./M.B.A., Pharm.D./MPH, and Pharm.D./Ph.D degree options of study are available. Graduate programs leading to Master of Public Health (MPH) and a Ph.D. in Pharmaceutical Sciences also are available.

NDSU's School of Nursing offers three tracks that lead to a Bachelor of Science in Nursing (BSN) degree and one that leads to a Doctor of Nursing Practice (DNP). The pre-licensure BSN track, both at NDSU Fargo campus and NDSU Nursing at Sanford Health in Bismarck, is a four-year course of study. The LPN to BSN track is a two-year course of study designed for licensed practical nurses (LPN) to obtain a BSN degree. Upon successful completion of the pre-licensure BSN and LPN to BSN programs, graduates are eligible to take the national council licensing examination (NCLEX) to become a registered nurse (RN). The RN to BSN track is a part-time, five semester course of study designed for Registered Nurses (RNs) to obtain a BSN degree. A graduate program leading to a Doctor of Nursing Practice (DNP) degree in the specialty area of Family Nurse Practitioner (FNP) is a full-time three-year course of study.

Plans of study leading to a four-year Bachelor of Science degree, major in Medical Laboratory Science (MLS), Respiratory Care (RC) or Radiologic Sciences (RS) include two to three years of academic course work on campus and a professional-level internship in an affiliated, hospital-based program. Required internships are 11-12 months in length for MLS, 15 months for RC, and two years for RS. Graduates are eligible to sit for national certifying examinations in their respective discipline.

The Bachelor of Sciences in Health Services is a flexible, inter-professional program designed to meet the educational needs of students who desire a career in health care not addressed by those described previously. Plans of study require both academic and a professional-level internship. However, the academic training and length of professional internship varies based on the career goals of the student.

Academic Preparation

All students must complete all required courses with a grade of 'C' or above and maintain a semester GPA of 2.00 or above for each semester in the College. A student who fails to meet this standard for two successive or three non-successive semesters may be suspended from enrollment in the College of Health Professions.

The faculty of the College reserves the right to terminate the enrollment of any student at any time if, in the opinion of the faculty, the student demonstrates that he or she is unsuited for a professional health career and its inherent responsibilities and obligations. Circumstances that may lead to student termination will include, but not be limited to, academic misconduct, violation of campus, state or federal statutes or regulations.

Admission

Selection committees will evaluate applicants for admission to the college professional programs and internships. NDSU coursework and transfer credits with grades of 'D' are not accepted for program requirements. Please contact the department for specific admission requirements.

Pharmacy

Additional high school preparation for the Pharmacy major is recommended. Prospective Pharmacy majors should present strong preparation in mathematics, physical/biological sciences, and in communication skills.

Admission to the program is competitive. Evaluations will be based on academic achievement, college records, state residency, Pharmacy College Admission Test (PCAT) scores, and other pertinent information. In addition, students must comply with criminal background and student conduct requirements. A personal visit, which includes an interview and test are a part of the evaluation process. A minimum cumulative GPA of 3.00 in college course work is required for evaluation for admission, with completion of virtually all required prerequisite courses by the end of spring term prior to beginning the professional program. (All core pre-pharmacy course work, which is indicated by an asterisk, must be completed by the end of the fall term prior to application deadline.) Actual admission GPA is generally much higher than 3.00. Information on application for admission to the professional program can be found on the School of Pharmacy website (<https://www.ndsu.edu/pharmacy/>).

Nursing

Nursing admission requirements vary by educational track. Admission is based on academic achievement along with other required application materials. Please visit the School of Nursing website (<https://www.ndsu.edu/nursing/>) for specific information including: deadlines, prerequisite requirements, and application materials.

Medical Laboratory Science

NDSU maintains affiliation agreements with seven hospital-based medical laboratory science programs that provide the required professional-level internship. Pre-MLS students who have completed all academic courses on campus by start of the internship and meet residency credit and GPA requirements may be eligible to apply for the internships. Admission into the internship is selective and based upon academic achievement, references, related experience, compliance with essential functions, and an interview. In addition, student applicants must also comply with criminal background and student conduct requirements. Internship application occurs annually in early fall. Application information is available from the **Department of Allied Sciences**. It is highly recommended that interested students meet with the MLS advisor for internship admission information at least one year prior to anticipated internship application.

Radiologic Sciences

Three specialized professional-level internships are available to NDSU RS majors: radiography, diagnostic medical sonography, and echocardiography. NDSU maintains affiliations with nine hospital-based radiologic technology programs that provide the internships in radiography. The echocardiography and diagnostic medical sonography internships are offered through an affiliation with Sanford Medical Center, Fargo, N.D. Pre-RS students who have completed the prerequisite courses on campus and meet residency credit and GPA requirements established by affiliated hospital programs may be eligible to apply for the two-year internship. Admission into the internship is competitive and based upon academic achievement, references, related experience, ability to meet program-designated technical standards, and an interview. In addition, students must comply with criminal background and student conduct requirements. Internship application occurs annually in the fall. Application information is available from the **Department of Allied Sciences**. It is highly recommended that interested students meet with their RS adviser for internship admission information at least one year prior to anticipated internship application.

Respiratory Care

The professional-level respiratory care internship is offered through an affiliation with Sanford Medical Center, Fargo, N.D. Pre-RC students eligible for internship application will have completed all prerequisite courses by the start of the internship with a grade of 'C' or better, met the residency credit requirement, and earned the minimum cumulative and "core" course GPA of 2.50. Application deadline is March 1. Admission into the internship is selective and based upon successful completion of all internship prerequisites, GPA, references, interview, related experience, and ability to meet program-designated technical standards. In addition, students must comply with criminal background and student conduct requirements. Applications for the internship are available from the **Department of Allied Sciences**. It is highly recommended that interested students meet with the RC advisor for internship admissions information at least one year prior to anticipated internship application.

Health Services

The Bachelor of Science in Health Services does not have specific admissions criteria. However, students must meet the academic, professional, and admissions requirements for any clinical site at which they complete their professional internships. Please visit the Bachelor of Sciences in Health Services Bulletin Page (<https://bulletin.ndsu.edu/programs-study/undergraduate/health-services/>) for more specific information.

School of Pharmacy (p. 1067)

School of Nursing (p. 1065)

Department of Public Health (<https://www.ndsu.edu/publichealth/>)

Department of Allied Sciences (p. 1041)

Faculty

- Backes, Alyssa, Lecturer, Nursing, BSN, Medcenter One College of Nursing
- Barnacle, Mykell, Assistant Professor of Practice, Nursing, DNP, North Dakota State University
- Benning, Kerri, Assistant Professor of Practice, Nursing, FNP-C
- Berger, Sara, Assistant Professor of Practice, Nursing, MSN, University of Mary
- Biberdorf, Robert, Emeritus Professor, Pharmacy Practice, MS, North Dakota State University
- Brass, Doreen, Lecturer - Simulation Educator, Nursing, MSN, University of Minnesota – Twin Cities
- Brooks, Amanda, Assistant Professor, Pharmaceutical Sciences, PhD, University of Wyoming
- Brynjulson, Rebecca, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Buettner-Schmidt, Kelly, Associate Professor, Nursing, PhD, University of New Mexico
- Carson, Paul, Professor of Practice, Public Health, MD, University of North Dakota
- Cernusca, Dan, Assistant Professor of Practice, Pharmacy Practice, PhD, University of Missouri-Columbia
- Danielson, Ramona, Research Associate Professor, Public Health, PhD, North Dakota State University
- Dewey, Mark, Associate Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Drummond, Amy, Lecturer, Pharmacy Practice, PharmD, North Dakota State University
- Eliason, Anne, Assistant Professor of Practice, Nursing, MSN, University of Mary
- Erickson, Stephanie, Lecturer, Nursing, MS, Rasmussen College
- Eukel, Heidi, Associate Professor, Pharmacy Practice, PharmD, North Dakota State University
- Falk, Kara, Assistant Professor of Practice, Nursing, MS, University of North Dakota
- Frenzel, Jeanne, Associate Professor, Pharmacy Practice, PharmD, North Dakota State University
- Friesner, Daniel, Professor, Pharmacy Practice; Associate Dean for Student Affairs and Faculty Development, PhD, Washington State University
- Gores, Gail, Simulation Educator, Nursing, MSN, University of Mary
- Grandbois, Donna M., Associate Professor, Nursing and Public Health, PhD, North Dakota State University
- Gross, Carla J., Associate Professor of Practice; Associate Dean of Nursing, PhD, North Dakota State University
- Gross, Dean, Assistant Professor of Practice, Nursing, DNSc, Rush University
- Guo, Ang, Assistant Professor, Pharmaceutical Sciences, PhD, Shanghai Institute of Health Sciences
- Guthmiller, Martha, Assistant Professor of Practice, Nursing, DNP, Augsburg College, Minneapolis, MN
- Hall, Susan, Assistant Professor of Practice, Nursing
- Harriger, Shannon, Assistant Professor of Practice, Nursing, DNP, Winona State University
- Harrington, Agnes E., Emeritus Professor, Pharmacy, MEd., North Dakota State University
- Haug, Karla, Assistant Professor of Practice, Nursing, MS, North Dakota State University
- Heuer, Loretta, Professor, Nursing, PhD, University of North Dakota
- Hohman, Adam, Assistant Professor of Practice, Nursing, DNP, North Dakota State University
- Hursman, Allison, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Huseth-Zosel, Andrea, Assistant Professor, Public Health, PhD, North Dakota State University
- Jansen, Rick, Assistant Professor, Public Health, PhD, University of Minnesota, Minneapolis
- Jarajapu, Yagna PR, Assistant Professor, Pharmaceutical Sciences, PhD, Glasgow Caledonian University, UK
- Johnson, Jill, Assistant Professor of Practice, Nursing, MSN., University of Phoenix
- Keller, Hollie, Assistant Professor of Practice, Nursing,
- Kelsch, Michael, Associate Professor of Practice, Department Vice Chair, Pharmacy Practice, PharmD, North Dakota State University
- Kenzie, Daniel, Assistant Professor of Practice, Pharmacy Practice, PhD, Purdue University
- Ketterling, Julie, Assistant Professor of Practice, Nursing
- Kiser-Larson, Norma, Professor Emeritus, Nursing, PhD
- Kopp, Wendy, Director of Nursing - Bismarck, Associate Professor of Practice, Nursing, MSN., University of Mary
- Kunkel, Charlys, Assistant Professor of Practice, Nursing, MSN., University of Mary
- Larson, Mary, Assistant Professor, Public Health, PhD, University of North Dakota

- Layek, Buddhadev, Assistant Professor, Pharmaceutical Sciences, PhD, North Dakota State University
- Leclerc, Estelle, Associate Professor, Pharmaceutical Sciences, PhD, University of Paris XI, France
- Lundeen, Tina, Assistant Professor of Practice, Nursing, DNP, North Dakota State University
- Maack, Brody, Associate Professor, Pharmacy Practice, PharmD, North Dakota State University
- MacAdams, Angela, Director, Allied Sciences, MEd, North Dakota State University
- Mackowick, Margaret S., Assistant Professor of Practice, Nursing, MS, University of North Dakota
- Mallik, Sanku, Professor, Pharmaceutical Sciences, PhD, Case Western Reserve University
- Marvanova, Marketa, Associate Professor, Chair, Pharmacy Practice, PharmD, Charles University, Prague
- Mathew, Sijo, Assistant Professor, Pharmaceutical Sciences, PhD
- McDaniel, Becky, Assistant Professor of Practice, Nursing, MSN., University of Mary
- Meyer, Stefanie, Assistant Professor of Practice, Public Health, PhD, North Dakota State University
- Miller, Donald R., Professor, Pharmacy Practice, PharmD, University of Michigan
- Mooney, Mary Margaret, Emeritus Professor, Nursing, D.N.Sc., Catholic University of America
- Muzzy Williamson, Julia, Assistant Professor of Practice, Pharmacy Practice, PharmD, Albany College of Pharmacy and Health Science
- Nadeau, Melanie, Assistant Professor of Practice, Public Health, MPH, University of Minnesota
- Naughton, Cynthia, Associate Professor, Pharmacy Practice; Senior Associate Dean, PharmD, North Dakota State University
- Nelson, Sharon, Assistant Professor of Practice, Nursing, PhD, University of North Dakota
- Obritsch, Christie, Assistant Professor of Practice, Nursing, MSN., University of Mary
- O'Rourke, Stephen T., Professor, Pharmaceutical Sciences, PhD, University of Wisconsin
- Patterson, Betty, Emeritus Professor, Pharmacy Practice, PhD, University of Iowa
- Peltier, Allison, Assistant Professor of Practice, Nursing, DNP, North Dakota State University
- Peterson, Charles D., Professor, Pharmacy Practice; Dean, College of Health Professions, PharmD, University of Minnesota
- Petry, Natasha, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Richter, Lisa, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Riggins, Janet, Lecturer, Nursing, MSN, Arizona State University
- Rose, Wanda, Associate Professor of Practice, Nursing, PhD, University of North Dakota
- Saarinen, Heidi, Assistant Professor of Practice, Nursing, DNP, North Dakota State University
- Sadowsky, Allison, Assistant Professor of Practice, Nursing, MSN., University of Mary
- Sandhurst, Holly, Assistant Professor of Practice, Nursing, EdD, College of St. Mary, Omaha, NE
- Schaeffer Fraase, Kolby, Lecturer, Nursing, MS, North Dakota State University
- Schnell, R. Craig, Professor Emeritus, Pharmaceutical Sciences, PhD, Purdue University
- Scott, David, Professor, Pharmacy Practice, PhD, University of Minnesota
- Secor-Turner, Molly, Associate Professor, Nursing, PhD, University of Minnesota
- Singh, Jagdish, Professor, Pharmaceutical Sciences; Department Chair, PhD, Banaras Hindu University, India
- Skoy, Elizabeth, Associate Professor, Pharmacy Practice, PharmD, North Dakota State University
- Slevin, Amber, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Smith, Mary, Assistant Professor of Practice, Nursing, MSN, University of Mary
- Steffen, Kristine, Professor, Pharmaceutical Sciences, PhD, North Dakota State University
- Strand, Mark, Professor, Pharmacy Practice, PhD, University of Colorado at Denver
- Strom, Patricia, Assistant Professor of Practice, Nursing, MEd, North Dakota State University
- Sun, Chengwen, Associate Professor, Pharmaceutical Sciences, PhD, Norman Bethune University of Medical Sciences, China
- Swanson, Kathleen, Assistant Professor of Practice, Nursing, DNP
- Thompson, Sara, Assistant Professor of Practice, Pharmacy Practice, PharmD, Belmont University College of Pharmacy, Nashville, TN
- Thompson, Shila, Assistant Professor of Practice, Nursing, PhD, South Dakota State University
- Turrubiates, Nancy, Lecturer, Clinical Coordinator, Nursing, MSN, Walden University
- Undem, Teri, Lecturer, Pharmacy Practice, B.S., University of Kansas
- Unterseher, Lindsey, Assistant Professor of Practice, Nursing, MSN., University of North Dakota
- Venkatachalem, Sathish, Assistant Professor, Pharmaceutical Sciences, PhD, University of Madras, India
- Vetter, Abigail, Assistant Professor of Practice, Nursing, MSN
- Vetter, Stefan, Research Assistant Professor, Pharmaceutical Sciences, PhD, Swiss Federal Institute of Technology, Switzerland
- Viets, Joni, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Werremeyer, Amy, Associate Professor of Practice, Pharmacy Practice, Pharm. D., North Dakota State University

- Wescott, Siobhan, Assistant Professor of Practice, Public Health, M.D., Harvard Medical School
- Wilhelm, Ross, Assistant Professor of Practice, Pharmacy Practice, PharmD, North Dakota State University
- Wynn, Cheryl, Assistant Professor of Practice, Nursing, MSN, University of North Dakota

College of Human Sciences and Education

www.ndsu.edu/hse/

The College of Human Sciences and Education was established in July 1992. There are six units in the college. Apparel, Merchandising, Interior Design, and Hospitality Management; Human Development and Family Science; Education; and Health, Nutrition, and Exercise Sciences offer programs at the bachelor's, master's, specialist and doctoral levels. The Center for 4-H Youth Development offers Extension youth programming across the state. The Office of Teaching and Learning serves the campus community through teaching and learning support and connects with the K-12 education system in the state. Students are prepared for careers in education, colleges and universities, business and industry, community services, hospitals and health care facilities, and public and private programs concerned with design, human welfare, fitness, and sport.

Mission

The mission of the College of Human Sciences and Education is to provide nationally recognized educational programs and conduct research and other scholarly activities that focus on people as they interact in work, educational, and living environments.

Opportunities are provided to broaden the student's understanding and appreciation of the aesthetic, cultural, economic, physical, psychological, and social elements that influence individual and family well-being. Programs are designed to help each student develop professional competencies, attain a liberal education, and relate the basic disciplines to various applications.

Accreditation

The Master of Athletic Training program (MATrg) is certified by the Commission on Accreditation of Athletic Training Education (CAATE). Education programs are accredited by the Council for the Accreditation of Educator Preparation (CAEP) and approved by the North Dakota Education and Standards and Practices Board (ESPB).

The School Counseling, Clinical Mental Health Counseling, and Counselor Education and Supervision programs are accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). The Dietetics program is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND). The Interior Design program is accredited by the Council for Interior Design Accreditation (CIDA).

The Exercise Science Program is endorsed by the Commission on Accreditation of Allied Health Education programs (CAAHEP): Committee on Accreditation for Exercise Sciences. Family Financial Planning is approved by the Certified Financial Planner (CFP) Board of Standards. Hospitality and Tourism Management is accredited by the Accreditation Commission for Programs in Hospitality Administration (ACPHA).

Degree Programs

Undergraduate programs in the college lead to a Bachelor of Science or a Bachelor of Arts degree. Recommendation of candidates for teacher certification also rests within this college through the School of Education (<https://www.ndsu.edu/education/>).

Graduate study leading to a Master of Science degree is offered in Human Development and Family Science, Counseling, Merchandising, Educational Leadership, Athletic Training, Leadership in Physical Education and Sport, Exercise Science, Nutrition Science, Dietetics, and Teacher Education. A Master of Education degree may be earned through Health, Nutrition and Exercise Sciences and the School of Education. A Master of Athletic Training (MATrg) degree may be earned through Health, Nutrition, and Exercise Sciences. Doctoral programs also are offered by the college in Counselor Education and Supervision, Developmental Science, Education and Exercise Science and Nutrition. The doctoral program in Education (Ph.D. or Ed.D.) has a cross-disciplinary emphasis, which allows students a choice between three tracks: Adult & Community Education, Institutional Effectiveness, and Organizational Learning & Leadership. A dual major doctoral program in gerontology is offered in coordination with a doctoral degree from one of the following areas: Developmental Science, Education and Exercise Science and Nutrition. For more complete details, see the Graduate Bulletin (p. 733) online.

The College of Human Sciences and Education offers seven master's programs or program options online. Online programs make earning an advanced degree an option for anyone accepted into the college of Graduate and Interdisciplinary Studies. The programs are: Merchandising, Family Financial Planning, Gerontology, Youth Development, Family and Consumer Science Education, Dietetics and Leadership in Physical Education and Sport. For more information view the Graduate School (<https://www.ndsu.edu/gradschool/>) web site.

Degree Requirements

Students enrolled in major programs in the college are required to follow curriculum guidelines, available in the Academic Advising Office (https://www.ndsu.edu/hde/academic_advising_center/) of the college or department offices, for each of the program options and majors. Course requirements in each program fulfill university, college, and departmental requirements. Refer also to graduation requirements and related information listed earlier in the Academic Policies (p. 28) section.

Courses taken pass/fail will not be used to satisfy any requirements other than total credits. Departments may have additional restrictions. Approval must be obtained and processed during the first three weeks of the regular semester. Once processed, a course cannot be changed back to regular grading.

General college requirements for undergraduate degrees extend beyond the minimum university general education requirements. An adviser should be consulted for specific courses. Students also are encouraged to follow their own interests in choosing electives that go beyond the minimum requirements.

Curriculum Majors and Options

- Apparel, Retail, Merchandising and Design
 - Apparel Studies Option
 - Retail Merchandising Option
- Dietetics
 - Didactic Program
 - Dietitian Education Program
- Exercise Science
 - Also available is a Master of Athletic Training degree in conjunction with a B.S. in Exercise Science, 5 year combined program
- Hospitality and Tourism Management
- Human Development and Family Science
 - Adult Development and Aging Option
 - Child Development Option
 - Family Science Option
 - Elementary Education*
 - Social Work**
- Interior Design
- Sport Management

- * Elementary Education
An Elementary Education program is available through the cooperation of Valley City State University (<http://www.vcsu.edu/>), the degree-granting institution for this program. This degree program must be completed concurrently with an HDFS major from NDSU. Upon completion of the Dual Degree Program, the graduate will have earned a Bachelor of Science degree from the College of Human Sciences and Education with a major in Human Development and Family Science from NDSU and a Bachelor of Science degree in Elementary Education from Valley City State University. The dual program is designed to be completed in four years on the campus of NDSU.
- ** Social Work
A Social Work program is available through the cooperation of Minot State University (<https://www.minotstateu.edu/>), the degree-granting institution for this program. The degree program must be completed concurrently with a HDFS major from NDSU. Upon completion of the dual degree program, the graduate will have earned a Bachelor of Science degree from the College of Human Sciences and Education with a major in Human Development and Family Science from NDSU and a Bachelor of Science degree in Social Work from Minot State University. The dual program is designed to be completed in four years on the campus of NDSU.

Secondary Education:

- Agricultural
- Art
- Biology
- Chemistry
- Comprehensive Science
- Earth Science
- English
 - Communication Option
- Family and Consumer Sciences
- French
- Health
 - School Health Option
- History
- Mathematics
- Music (Instrumental or Vocal)

- Physical Education (K-12)
- Physics
- Social Science
- Spanish

Minors

A minor is a similar grouping of courses in which the university requires a minimum of 16 credits. (At least eight credits of the minor must be taken at NDSU.) Departments may require more credits for their minors. For the minors to be awarded, students must declare a minor using the *Major/Minor Change Form*. Information on specific minors may also be obtained in the Academic Advising Office (https://www.ndsu.edu/hde/academic_advising_center/). Minors offered in the college are:

- Apparel, Retail Merchandising and Design
- Extension Education
- Health Education
- Hospitality and Tourism Management
- Human Development and Family Science
- Interior Design
- Wellness

Undergraduate Certifications

- Certified Family Life Education (CFLE)
- Coaching
- Food Sanitation
- Physical Best

Interdisciplinary Programs

The College of Human Sciences and Education participates in two interdisciplinary programs on campus:

- Gerontology Minor
- Wellness Minor
- Women and Gender Studies Major and Minor

Special Opportunities

Special opportunities available to students in the college include the following:

Professional Organizations

Student chapters of professional organizations are available for membership in accordance with their respective bylaws.

- American Association of Family and Consumer Sciences (AAFCS)
- American Society of Interior Designers (ASID)
- Aspiring Teachers of Mathematics and Science (ATOMS)
- Chi Sigma Iota
- Collegiate FFA/Postsecondary Agriculture Students (CFFA/PAS)
- Elementary Education Club
- Eta Sigma Delta (honorary)
- Exercise Science Club

- Fashion, Apparel, and Business Organization (FABO)
- HSE Ambassadors
- Hospitality Student Association (HSA)
- Human Development and Family Science Club
- Phi Upsilon Omicron (honorary)
- Student Social Work Organization (SSWO)
- Sport Management Association (SMA)
- Student Association of Nutrition and Dietetics (SAND)
- Student North Dakota United (SNDU)

Additional information is available in the Dean's Office of the college.

HSE Ambassadors

The HSE Ambassadors act as a liaison organization between the student body, the faculty, and the Dean of the College of Human Sciences and Education. The Ambassadors assist in the promotion of the college. Students supplement and complement the existing advisory system. Student selection is based on academics and a willingness to participate. Student members represent all units in the college. Applications for HSE Ambassadors are reviewed each year. Information is available in the Dean's Office (https://www.ndsu.edu/hde/deans_welcome/) of the college (255 EML).

Cooperative Education

Cooperative Education, a program of the Career Center, offers undergraduate and graduate students an opportunity to integrate classroom study with paid, career related work experience for academic credit. Work may be full or part time. See Career Center (<https://www.ndsu.edu/career/>) for further information. A Cooperative Education experience may substantially improve students' employment opportunities after graduation.

Apparel, Merchandising, Interior Design & Hospitality Management (p. 1043)

Health, Nutrition & Exercise Sciences (p. 1056)

Human Development & Family Science (p. 1057)

School of Education (p. 1050)

College Requirements

Bachelor of Science Degree (B.S.)

Requirements include those outlined on the curriculum guide and include the university's general education, college and departmental requirements.

Bachelor of Arts Degree (B.A.)

In addition to the Bachelor of Science degree, a Bachelor of Arts degree also includes the following:

- Six (6) additional credits of humanities and social behavioral sciences
- Two years of one modern foreign language at the college level or equivalent

Students should refer to the Bachelor of Arts Using a Second Language (p. 65) section within the Undergraduate Degree and Graduation Information (p. 63) page of this Bulletin.

Faculty

- Aakre, Dean E., Extension Specialist, M.Ed., 1998, North Dakota State University
- Anderson, Earl A., Emeritus Professor, Education, Ed.D., 1962, Washington State University
- Anderson, Sharon D., Emeritus Professor, Human Development and Education, Ph.D., 1994, University of North Dakota
- Asperin, Amelia Estepa, Associate Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 2007, Kansas State University
- Bach, Annette S., Emeritus Professor, Extension, M.S., 1972, University of Southern California
- Bano, Sara, Assistant Professor, School of Education, Ph.D., 2020, Michigan State University

- Baggett, Ashley, Associate Professor, History, Philosophy, and Religious Studies and School of Education, Ph.D., 2014, Louisiana State University
- Bastow-Shoop, Holly E., Emeritus Professor, Apparel, Merchandising, Interior Design, and Hospitality Management; Ph.D., 1981, Oklahoma State University
- Beck, Patricia L., Emeritus Professor, Extension, M.S., 1965, Colorado State University
- Benna, Justin, Assistant Professor of Practice, School of Education, Ph.D., 2018, University of New Hampshire
- Berglund, Patricia, Emeritus Professor, Health, Nutrition and Exercise Sciences, Ph.D., 1988, North Dakota State University
- Biewer, Adrian, Extension Specialist, M.S., 1981, North Dakota State University
- Blodgett Salafia, Elizabeth, Associate Professor, Human Development and Family Science, Ph.D., 2008, University of Notre Dame
- Borgen, Vernon A., Adjunct Professor, Health, Nutrition and Exercise Sciences, B.S., 1979, North Dakota State University
- Borr, Mari, Professor, School of Education, Ph.D., 2005, University of North Dakota
- Braaten, Ann W., Associate Professor of Practice, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 2005, University of Minnesota
- Brotherson, Sean, Extension Specialist and Professor, Human Development and Family Science, Ph.D., 1999, Oregon State University
- Brunt, Ardith R., Emeritus Professor, Health, Nutrition and Exercise Sciences, Ph.D., 1999, Iowa State University
- Buchholz Holland, Carol, Associate Professor, School of Education, Ph.D., 2005, Kansas State University
- Burkholder, Vel Rae, Emeritus Professor, Health, Nutrition and Exercise Sciences, M.S., 1968, North Dakota State University
- Carlson, Thomas Stone, Professor, Human Development and Family Science, Ph.D., 2000, Iowa State University
- Choi, Juwon, Assistant Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 2016, Kansas State University, Manhattan
- Christensen, Bryan K., Professor, Health, Nutrition and Exercise Sciences, Ph.D., 2000, University of Kansas
- Christensen, Warren M., Associate Professor, Physics and School of Education, Ph.D., 2007, Iowa State University
- Cordova, Amanda, Assistant Professor, School of Education, Ph.D., 2018, University of Texas at San Antonio
- Crary, Sarah, Assistant Professor, School of Education, Ph.D., 2018, University of North Dakota
- Dahl, Laura, Assistant Professor, School of Education, Ph.D., 2019, The Ohio State University
- Danielson, Jessica, Assistant Professor of Practice, School of Education, Ph.D., 2018, North Dakota State University
- David, Shannon, Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2013, Ohio University
- Deal, James, Interim Dean, College of Human Sciences and Education/Professor, Human Development and Family Science; Ph.D., 1987, University of Georgia
- Ditterick, Megan, Extension Specialist and Coordinator, EFNEP, M.S., 2007, Colorado State University
- Deutsch, Michael Joseph, Jr., Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2007, North Dakota State University
- Dittman, Jennette K., Emeritus Professor, School of Education, Ph.D., 1974, Pennsylvania State University
- Dobry, Alberta M., Emeritus Professor, School of Education, Ph.D., 1973, Michigan State University
- Douglas, Mary, Associate Professor of Practice, Health, Nutrition, and Exercise Sciences, Ph.D., 2009, Michigan State University
- Duffield, Stacy K., Director, Office of Teaching and Learning/Professor, School of Education, Ph.D., 2003, University of North Dakota
- Erhardt, Marvin J., Adjunct Assistant Professor, Education, Ed.D., 1994, University of Wyoming
- Fitzgerald, Margaret A., Professor, Human Development and Family Science, Ph.D., 1997, Iowa State University
- Fragodt, Alvin L., Emeritus Professor, Extension, M.S., 1974, North Dakota State University
- Fuller, Heather R., Associate Professor, Human Development and Family Science, Ph.D., 2009, University of Michigan
- Gange, Kara, Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2010, North Dakota State University
- Garden-Robinson, Julie A., Extension Specialist and Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 1994, North Dakota State University
- German, Nicole, Emeritus Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2008, North Dakota State University
- Gilblom, Elizabeth, Assistant Professor, School of Education, Ph.D., 2017, Cleveland State University
- Gulbrandson, Ruth, Emeritus Professor, Extension, M.S., 1973, North Dakota State University
- Hackney, Kyle, Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2013, Syracuse University
- Hall, Brenda S., Emeritus Professor, School of Education, Ed.D., 1993, Virginia Polytechnic Institute and State University
- Hamre, Kellie, Senior Lecturer, Apparel, Merchandising, Interior Design and Hospitality Management, M.S., 2013, Colorado State University
- Hauser, Fredric J., Emeritus Professor, Extension, M.S., 1967, North Dakota State University
- Hektner, Joel, Professor, Human Development and Family Sciences, Department Head, Ph.D., 1996, University of Chicago
- Hill, Brent, Associate Professor, School of Education, Ph.D., 2011, Oklahoma State University
- Hilliard, Elizabeth, Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2018, North Dakota State University
- Hoffman, Jeanette, Associate Professor of Practice, School of Education, Ed.D., 2006, University of St. Thomas
- Hoffmann, Meagan, Assistant Professor/Extension 4H Youth Development Specialist, Ph.D., Oklahoma State University
- Holbrook, Sandra, Adjunct Professor, School of Education, Ph.D., 1984, University of Minnesota

- Holm, Edna T., Emeritus Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 1987, University of Minnesota
- Honrath, Kerrie, Lecturer, Health, Nutrition, and Exercise Sciences, M.S., 2013, North Dakota State University
- Horejsi, Roman J., Emeritus Professor, Health, Nutrition, and Exercise Sciences, Ed.D., 1991, University of North Dakota
- Johnson, Carrie, Interim Assistant Director, Family and Community Wellness, and Associate Professor, Human Development and Family Science, Ph.D., 2012, Iowa State University
- Johnson, Nicole, Extension Specialist, Health, Nutrition, and Exercise Sciences, M.S., 2011, Nebraska Methodist College
- Johnson, Virginia Clark, Emeritus Dean and Professor, Human Development and Family Science, Ph.D., 1984, Pennsylvania State University
- Kaler, Nancy J., Senior Lecturer, Human Development and Family Science, M.S., 1981, University of North Dakota
- Kapplinger, Eunice, Emeritus Associate Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, M.S., 1988, Minnesota State University
- Korcuska, James S., Professor, School of Education, Ph.D., 2000, Kent State University
- Kryjevskaja, Mila, Associate Professor, Physics and School of Education, Ph.D., 2008, University of Washington
- Lee, Jaeha, Professor, Apparel, Merchandising, Interior Design and Hospitality Management, Ph.D., 2008, University of Minnesota
- Lewis, Todd, Professor, School of Education, Ph.D., 2002, Kent State University
- Light, Harriett E., Emeritus Professor, Human Development and Family Science, Ph.D., 1976, Michigan State University
- Linker, Jenny, Associate Professor, Health, Nutrition, and Exercise Sciences and School of Education, Ph.D., 2011, University of Illinois
- Lyman, Katie, Associate Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2014, University of South Florida
- Mackey, Hollie, Associate Professor, School of Education, Ph.D., 2010, The Pennsylvania State University
- Manikowske, Linda J., Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 1993, Iowa State University
- Martin, William O., Emeritus Professor, School of Education and Mathematics; Ph.D., 1993, University of Wisconsin-Madison
- Martindale, Thomas, Emeritus Professor, Extension, M.S., 1967, University of North Dakota
- Marx, Adam A., Associate Professor, School of Education, Ph.D., 2014, The University of Missouri
- Maughan, Arthur W., Emeritus Professor, Health, Nutrition, and Exercise Sciences, M.S., 1966, North Dakota State University
- McAllister, Shirley E. Friend, Emeritus Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ed.D., 1960, University of Arkansas
- McGeorge, Christine R., Professor, Human Development and Family Science, Ph.D., 2005, University of Minnesota
- McGrath, Ryan, Assistant Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2015, University of Idaho
- McQueston, Jessica, Assistant Professor of Practice, School of Education, Ph.D., 2020, University of Wisconsin-Madison
- Montplaisir, Lisa, Professor, Biological Sciences and School of Education, Ph.D., 2003, University of Arizona
- Napoleon, Larry II, Associate Professor, School of Education, Ph.D., 2009, Pennsylvania State University-University Park
- Narum, Gary A., Emeritus Associate Professor, School of Education, Ed.D., 1969, University of Wyoming
- Nass, Marillyn, Emeritus Professor, Health, Nutrition, and Exercise Sciences, M.S., 1955, Pennsylvania State University
- Nelson, Jill, Interim Dean, College of Human Sciences and Education/Professor, School of Education, Ph.D., 2005, Kent State University
- Nielsen, Robert C., Emeritus Professor, School of Education, Ed.D., 1973, University of Northern Colorado
- North, Barbara B., Emeritus Professor, Health, Nutrition, and Exercise Sciences, M.S., 1959, University of Minnesota
- Nyachwaya, James, Associate Professor, School of Education and Chemistry, Ph.D., 2012, University of Minnesota, Minneapolis
- O'Connor, Melissa, Associate Professor, Human Development and Family Science, Ph.D., 2010, University of South Florida
- O'Shea, Cailen, Assistant Professor, School of Education, Ph.D., 2019, University of Nebraska-Lincoln
- Overton, Kimberly A., Associate Professor of Practice, School of Education, Ph.D., 2008, North Dakota State University
- Pankow, Debra L., Associate Professor Emeritus and Extension Specialist, Human Development and Family Science, Ph.D., 2002, South Dakota State University
- Park, Jeongdoo, Associate Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 2014, Washington State University
- Park, Kwangsoo, Associate Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Department Head and Stegner Endowed Professor, Ph.D., 2013, Temple State University
- Parson, Laura, Assistant Professor, School of Education, Ph.D., 2016, University of North Dakota
- Philbrick, Candace, Senior Lecturer, Human Development and Family Science, Ph.D., 2008, North Dakota State University
- Pieterick, Justin, Lecturer, Health, Nutrition, and Exercise Sciences, M.S., 2016, Minnesota State University Moorhead
- Quamme, Susan, Extension Specialist, 4-H Youth Development – Youth Leadership and Civic Engagement, M.S., North Dakota State University, 2011
- Query, Sharon, Associate Professor of Practice Emeritus, Human Development and Family Science, Ph.D., Iowa State University, 1997
- Ragan, Ann, Senior Lecturer, Apparel, Merchandising, Interior Design, and Hospitality Management, M.S., 2013, University of Nebraska-Lincoln
- Ray, Chris M, Associate Professor, School of Education, Department Head, Ph.D., 2007, Oklahoma State University

- Ray-Degges, Susan, Professor, Apparel, Merchandising, Interior Design, and Hospitality Management, Ph.D., 1995, University of Missouri-Columbia
- Redenius, Nicklaus, Lecturer, Health, Nutrition, and Exercise Sciences, M.S., 2016, North Dakota State University
- Rhee, Yeong S., Professor, Health, Nutrition, and Exercise Sciences, Department Head, Ph.D., 1999, Oklahoma State University
- Roseno, Ashley, Assistant Professor of Practice, Health, Nutrition, and Exercise Sciences, Ph.D., 2019, North Carolina State University
- Salajan, Florin D., Associate Professor, School of Education, Ed.D., 2007, Columbia University
- Sanders, Gregory F., Emeritus Professor, Human Development and Family Science; Ph.D., 1983, University of Georgia
- Sassi, Kelly, Professor, English and School of Education, Ph.D., 2008, University of Michigan
- Scoby, Donald R., Emeritus Professor, Botany/Biology and School of Education, Ph.D., 1968, North Dakota State University
- Shume, Teresa, Assistant Professor, School of Education, Ph.D., 2013, University of North Dakota
- Stastny, Sherri N., Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 2007, North Dakota State University
- Strand, Bradford N., Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 1988, University of New Mexico
- Strommen, Jane, Assistant Professor of Practice, Human Development and Family Sciences, Ph.D. 2013, North Dakota State University
- Sunderlin, Sara, Senior Lecturer, Apparel, Merchandising, Interior Design, and Hospitality Management, M.S., 2001, North Dakota State University
- Teigland, John J., Emeritus Professor, School of Education, Ph.D., 1964, University of North Dakota
- Tangen, Jodi, Assistant Professor, School of Education, Ph.D., 2015, University of North Carolina, Greensboro
- Terbizan, Donna J., Professor, Health, Nutrition, and Exercise Sciences, Ph.D., 1982, Ohio State University
- Thiel, Brooke, Assistant Professor School of Education, Ph.D., 2020, North Dakota State University
- Tracy, Tyler, Lecturer, Health, Nutrition, and Exercise Sciences, M.S., 2013, North Dakota State University
- Trautwein, Charlotte G., Emeritus Professor, Music and Human Development and Family Science and Education, M.S., 1968, University of Illinois
- Vetter, Rachel E., Professor, School of Education; Extension Specialist, Ph.D., 2006, North Dakota State University
- Wageman, Justin, Professor, School of Education, Ph.D., 1999, University of North Dakota
- Wallman, George H., Emeritus Professor, School of Education, Ph.D., 1980, Michigan State University
- Werlinger, Ann, Senior Lecturer, Human Development and Family Science, M.S., 2005, North Dakota State University
- Wigtil, James V., Emeritus Professor, School of Education, Ed.D., 1966, Indiana University
- Wilcox, Heidi, Adjunct Professor, Apparel, Design, and Hospitality Management, MPA, 2002, University of Mary
- Winters, Lynette, Director Emeriti, Health, Nutrition, and Exercise Sciences, M.S., 1987, South Dakota State University
- Wood, Nathan, Associate Professor, School of Education, Ph.D., 2006, University of Minnesota
- Woods, William G., Emeritus Professor, School of Education, Ed.D., 1969, Washington State University
- Wyum, Dena, Senior Lecturer, Human Development and Family Science, M.S., 2008, North Dakota State University

College of Science and Mathematics

Opportunities in the college reflect the belief that an understanding of the methods and findings of science is best achieved through first-hand experience in the process of conducting, analyzing, and reporting research. Students are encouraged to participate in this process by working closely with faculty and other students in laboratory and field research, thus gaining direct knowledge of the power, limits, and problems in scientific inquiry. These opportunities for direct experience with the tools of the scientist are liberally available to the interested and motivated student.

Degree Programs

The College of Science and Mathematics provides undergraduate programs leading to a Bachelor of Science or Bachelor of Arts degree. Graduate programs at the master's and doctoral levels also are offered.

Undergraduate Programs of Study

All majors are required to complete departmental and general education requirements. Available majors include the following:

- Behavioral Statistics
- Biochemistry and Molecular Biology
- Biological Sciences
- Biotechnology
- Chemistry
- Geology
- Mathematics
- Physics

- Psychology
- Statistics

Minors are also available in most departments.

College Requirements

General college requirements for the two undergraduate degrees extend beyond the minimum university general education requirements (<https://www.ndsu.edu/registrar/academics/gened/>). The college requires an additional six credits in humanities and/or social sciences for the Bachelor of Science degree and an additional 12 credits for the Bachelor of Arts degree. This requirement may be fulfilled by any degree-eligible course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major. An adviser should be consulted for specific courses. Students also are encouraged to follow their own interests in choosing electives that go beyond the minimum requirements.

Pass/Fail Grading

Courses to fulfill the major requirements in the college may not be taken pass/fail with the exception of courses that are only offered pass/fail. Only elective courses outside the major may be taken pass/fail. Some departments require a grade of 'C' or higher in courses to count toward major requirements. This includes both NDSU and transferred coursework.

Bachelor of Arts Degree

B.A. degree requirements are the same as the B.S. degree with an additional six credits of humanities or social and behavioral sciences and the addition of two years of a modern foreign language. This means completion of the second year of college-level language or the equivalent. Refer to the Bachelor of Arts Requirement using a Second Language (p. 65) section within the Academic Degree Information (p. 31) section of the Academic Policies (p. 28).

All degree candidates must apply for graduation through the Office of Registration and Records (<https://www.ndsu.edu/registrar/>) according to university procedures and deadlines.

Specializations

Specializations are provided for career preparation in a range of areas.

Pre-Professional Programs

Pre-professional curricula are offered by a number of departments for students interested in preparing for careers in medicine, dentistry, mortuary science, chiropractic, optometry, osteopathy, and other health related fields. Most pre-professional programs are flexible and can be developed around many different majors. Departments that advise pre-professional majors include biological sciences, chemistry and biochemistry, physics and psychology.

In addition to the preceding, a number of departments have developed other specializations to meet today's rapidly changing job markets. These may be found in the individual department sections as follows:

- **Biological Sciences:** environmental science, biotechnology, biological sciences education, comprehensive science education, wildlife and fisheries biology, cell biology/physiology, and zoology
- **Chemistry:** biochemistry, biotechnology, chemistry education, pre-professional chemistry, coatings and polymeric materials
- **Geosciences:** geochemistry
- **Psychology:** natural science, social sciences, behavioral neuroscience, industrial-organizational, human services, managerial psychology, and experimental

Teacher Certification

Several of the majors available through the College of Science and Mathematics may lead to careers in teaching.

Students may complete the requirements for a major in the college, then apply for admission to the School of Education (<https://www.ndsu.edu/education/>) in the College of Human Development and Education to undertake the additional requirements necessary to qualify for teacher certification. Alternatively, students may initially select a science and mathematics education curriculum offered through the School of Education.

Programs leading to teacher certification are available in the following areas: biological sciences, chemistry, comprehensive science, earth science, mathematics, and physics.

Students interested in teacher education are encouraged to declare a double major in their discipline and in education (i.e., chemistry education and chemistry). Such double majors may be earned by successful completion of a few additional credits. Students should contact their advisers for details, and are encouraged to declare their primary and secondary majors with the Office of Registration and Records, 110 Ceres Hall.

Pre-Medicine and Pre-Dentistry Programs

While Pre-Medical Professions is not a declarable major or degree program at NDSU, the College of Science and Mathematics offers a variety of majors that will prepare students for entrance exams and acceptance to their medical profession program of choice. NDSU students who wish to pursue a medical program within medicine, dentistry, optometry, physician's assistant, mortuary science, or chiropractic while completing a baccalaureate degree must declare a major and complete all degree and university requirements in conjunction with fulfilling medical profession requirements.

Students preparing for application to a medical professional school should consult with a pre-medical professions advisor. We encourage you to visit the Pre-Medical Professions (https://www.ndsu.edu/prehealth_programs/) website for more information and scheduling an advising appointment.

In order for NDSU students to be competitive for their intended graduate program, they must:

- Show strong academic performance in all required and recommended coursework.
- Participate in out of classroom experiences such as volunteering, peer mentoring or tutoring, research activities, health related work opportunities and job shadowing.
- Get involved with student organizations that offer guest speakers, community service opportunities and support. Pursue leadership opportunities.
- Make connections with faculty and medical professionals.
- Practice and prepare for required entrance exams.
- Attend seminars and information sessions that are offered to provide information and resources regarding application and interview processes.

Contact the Department of Biological Sciences (<https://www.ndsu.edu/biology/>) for additional information (231-7087).

Interdisciplinary Programs

The College of Science and Mathematics participates in the following undergraduate interdisciplinary programs.

Biotechnology Major

Biotechnology is an interdisciplinary field based on a combination of biology and technology. It includes the application of science and technology to the design of new plants, animals, and microorganisms that have improved characteristics.

Natural Resources Management Major

This interdisciplinary program is available through the College of Science and Mathematics' Biological Sciences Department (p. 1046) and the College of Agriculture, Food Systems and Natural Resources' School of Natural Resources (p. 1065) and the College of Engineering (<https://www.ndsu.edu/coe/>).

Cooperative Education

Cooperative Education, a program of the Career Center, offers undergraduate and graduate students an opportunity to integrate classroom study with paid, career-related work experience for academic credit. Work may be full or part time. A Cooperative Education experience may substantially improve students' employment opportunities after graduation. Students may obtain one or two semesters of professional work experience related to their studies; however, no more than a total of three credits may be applied to the minimum of 122 credits required for the degree. Each department has specific requirements for earning these credits. The student must have approval from the department chair prior to beginning the Cooperative Education (<https://career.ndsu.edu/internship-program/>) program. See Career Center (<https://www.ndsu.edu/career/>) for more information.

Biological Sciences (p. 1046)

Chemistry & Biochemistry (p. 1046)

Coatings & Polymeric Materials (p. 1048)

Geosciences (p. 1056)

Mathematics (p. 1060)

Physics (p. 1069)

Psychology (p. 1072)

Statistics (p. 1073)

College Requirements

Code	Title	Credits
Bachelor of Arts (BA) Degree – An additional 12 credits Humanities and Social Sciences and proficiency at the second year level in a modern foreign language. *		12
Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *		6

* Humanities and Social Sciences may be fulfilled by any course having the following prefix: ADHM, ANTH, ARCH, ART, CJ, CLAS, COMM, ECON, ENGL, FREN, GEOG, GERM, HDFS, HIST, LA, LANG, MUSC, PHIL, POLS, PSYC, RELS, SOC, SPAN, THEA, WGS, or any course from the approved list of general education courses in humanities and social sciences (general education categories A and B). These credits must come from outside the department of the student's major.

Faculty

- Akhmedov, Azer, Professor of Mathematics, Ph.D., 2004, Yale University
- Aldrich-Wolfe, Laura, Associate Professor of Biological Sciences, Ph.D., 2006, Cornell University
- Alfonseca, Maria, Associate Professor of Mathematics, Ph.D., 2003, Universidad Autonoma de Madrid, Spain
- Anteau, Michael J, Adjunct Professor of Biological Sciences, Ph.D., 2006, Louisiana State University
- Ashworth, Allan C., Emeritus University Distinguished Professor and James A. Meier Professor of Geology, Ph.D., 1969, University of Birmingham, England
- Balas, Benjamin, Professor of Psychology, Ph.D., 2007, Massachusetts Institute of Technology
- Barabanov, Nikita, Professor of Mathematics, Ph.D., 1979, Leningrad University, Russia, Doctor of Science, 1990, Kiev Institute of Cybernetics
- Battocchi, Dante, Assistant Professor of Coatings and Polymeric Materials, Ph.D., 2002, University of Trento, Italy
- Blakeslee, Barbara, Research Professor of Psychology, Ph.D., 1983, University of California, Santa Barbara
- Bleier, William J., Emeritus Distinguished Professor and Jordan Engberg Professor of Biological Sciences, Ph.D., 1975, Texas Tech University
- Booth, Kimberly, Assistant Professor of Practice in Biological Sciences, Ph.D., 2016, North Dakota State University
- Boudjouk, Philip, Distinguished Professor of Chemistry and Biochemistry, Ph.D., 1971, University of Wisconsin, Madison
- Bowsher, Julia H., Associate Professor of Biological Sciences, Ph.D., 2007, Duke University
- Boynton, Jason, Associate Professor of Mathematics, Ph.D., 2006, Florida Atlantic University
- Brammer, J.D., Emeritus Professor of Biological Sciences, Ph.D., 1968, Purdue University
- Brophy, John A., Emeritus Professor of Geology, Ph.D., 1958, University of Illinois
- Buckner, James S., Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1971, North Dakota State University
- Buitron, Deborah, Adjunct Professor of Biological Sciences, Ph.D., 1982, University of Minnesota
- Buncher, John, Associate Professor of Practice of Physics, Ph.D., 2010, Purdue University
- Burghaus, Uwe, Associate Professor of Chemistry and Biochemistry, Ph.D., 1995, Free University Berlin
- Butler, Malcolm G., Emeritus Professor of Biological Sciences, Ph.D., 1980, University of Michigan
- Calvo, Jorge, Adjunct Professor of Mathematics, Ph.D., 1998, University of California-Santa Barbara
- Choi, Bong-Jin, Assistant Professor of Statistics, Ph.D., 2014, University of South Florida
- Choi, Yongki, Associate Professor of Physics, Ph.D., 2010, City University of New York
- Christensen, Warren, Associate Professor of Physics/School of Education, Ph.D., 2007, Iowa State University
- Ciuperca, Catalin, Professor of Mathematics, Ph.D., 2001, University of Kansas
- Clambey, Gary K., Emeritus Associate Professor of Biological Sciences, Ph.D., 1975, Iowa State University
- Colbert, Christopher, Associate Professor of Chemistry and Biochemistry, Ph.D., 2000, Purdue University
- Coleman, Martin, Associate Professor of Psychology, Ph.D., 2005, University of Sussex
- Çömez, Doğan, Professor of Mathematics, Ph.D., 1983, University of Toronto, Canada
- Conwell, Erin, Associate Professor of Psychology, Ph.D., 2009, Brown University
- Cook, Gregory, Professor of Chemistry and Biochemistry; Department Chair, Ph.D., 1993, Michigan State University
- Coonce, Harry B., Adjunct Professor of Mathematics, Ph.D., 1969, University of Delaware
- Cope, Davis, Emeritus Associate Professor of Mathematics, Ph.D., 1980, Vanderbilt University
- Coykendall, James, Adjunct James A. Meier Professor of Mathematics, Ph.D., 1995, Cornell University
- Croll, Andrew, Associate Professor of Physics, Ph.D., 2009, McMaster University, Ontario
- Croll, Stuart G., Emeritus Professor of Coatings and Polymeric Materials, Adjunct Professor of Physics, Ph.D., 1974, University of Leeds, U.K.
- Crosby, Ross D., Adjunct Professor of Psychology, Ph.D., 1989, University of Nevada, Reno
- Day, Stephanie S., Associate Professor of Geology, Department Chair, Ph.D., 2012, University of Minnesota
- Degges, Ronald C., Professor of Practice of Statistics, Ph.D., 2011, North Dakota State University

- Denton, Alan R., Professor of Physics, Ph.D., 1991, Cornell University
- Dochtermann, Ned A., Associate Professor of Biological Sciences, Ph.D., 2009, University of Nevada-Reno
- Dorfmeister, Josef, Associate Professor of Mathematics, Ph.D., 2009, University of Minnesota
- Duncan, Benton, Professor of Mathematics; Ph.D., 2004, University of Nebraska-Lincoln
- Duggan, Katherine A., Assistant Professor of Psychology, Ph.D., 2016, University of California, Riverside
- Duysen, Murray E., Emeritus Professor of Biological Sciences, Ph.D., 1966, University of Nebraska
- Egorov, Ivan, Assistant Professor of Mathematics, Ph.D., 2014, Lomonosov Moscow State University
- Esslinger, Theodore L., Emeritus Professor of Biological Sciences, Ph.D., 1974, Duke University
- Euliss, Ned, Adjunct Professor of Biological Sciences, Ph.D., 1989, Oregon State University
- Fawley, Karen, Adjunct Professor of Biological Sciences, Ph.D., 1998, North Dakota State University
- Fawley, Marvin W., Adjunct Professor of Biological Sciences, Ph.D., 1985, Miami University
- Fischer, Allan G., Emeritus Dean and Emeritus Professor of Biochemistry and Molecular Biology, Ph.D., 1966, Indiana University
- Fulton, Mark R., Adjunct Professor of Biological Sciences, Ph.D., 1991, Uppsala University
- Galitz, Donald S., Emeritus Professor of Biological Sciences, Ph.D., 1961, University of Illinois
- Garvey, Roy G., Emeritus Professor of Chemistry and Biochemistry, Ph.D., 1966, University of Utah
- Gelling, Victoria Johnston, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 2001, North Dakota State University
- Gephard, Matthew S., Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1990, Stanford University
- Gerst, Jeffery W., Emeritus Professor of Biological Sciences, Ph.D., 1973, University of Nebraska
- Gillam, Erin H., Professor of Biological Sciences, Ph.D., 2007, University of Tennessee
- Glass, J. Edward, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1964, Purdue University
- Greenlee, Kendra J., Professor of Biological Sciences, Department Chair, Ph.D., 2004, Arizona State University
- Greenwood, Torin, Assistant Professor of Mathematics, Ph.D., 2015, University of Pennsylvania
- Greives, Timothy J., Associate Professor of Biological Sciences, Ph.D., 2009, Indiana University-Bloomington
- Grier, James W., Emeritus Professor of Biological Sciences, Ph.D., 1975, Cornell University
- Hakk, Heldur, Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1997, North Dakota State University
- Hamilton, Jill, Associate Professor of Biological Sciences, Ph.D., 2012, University of British Columbia
- Hamm, Jeremy, Assistant Professor of Psychology, Ph.D., 2016, University of Manitoba
- Hammond, James J., Adjunct Professor of Statistics, Ph.D., 1969, University of Nebraska
- Hammond, Richard, Adjunct Professor of Physics, Ph.D., 1979, Rennselaer Polytechnic Institute
- Hanson, Mark A., Adjunct Professor of Biological Sciences, Ph.D., 1990, North Dakota State University
- Haring, Ferdinand, Emeritus Professor of Mathematics, M.S., 1962, Illinois Institute of Technology
- Haring, Stuart, Associate Professor of Chemistry and Biochemistry, Ph.D., 2004, University of Iowa
- Hass, Lonnie D., Emeritus Senior Lecturer of Mathematics, M.A., 1972, University of Illinois
- Hatzenbuehler, Elaine C., Emeritus Senior Lecturer of Geology, B.S., 1971, Kansas State University
- Heidinger, Britt J., Associate Professor of Biological Sciences, Ph.D., 2007, Indiana University
- Heilmann, Larry J., Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1984, Wesleyan University
- Hershberger, John F., Professor of Chemistry and Biochemistry, Ph.D., 1986, Yale University
- Hill, Loren, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1965, Pennsylvania State University
- Hilmert, Clayton J., Associate Professor of Psychology, Ph.D., 2003, University of California-San Diego
- Hinsz, Verlin B., Professor of Psychology, Ph.D., 1983, University of Illinois
- Hobbie, Erik K., Professor of Physics/Coatings and Polymeric Materials; Director of Materials and Nanotechnology Program, Ph.D., 1990, University of Minnesota
- Hodgson, Angela L., Professor of Practice of Biological Sciences, Ph.D., 2010, University of Minnesota
- Irish, Leah A., Associate Professor of Psychology, Ph.D., 2011, Kent State University
- Johnson, Douglas H., Adjunct Professor of Biological Sciences, Ph.D., 1986, North Dakota State University
- Johnson, Ivan M., Adjunct Professor of Biological Sciences, Ph.D., 1969, University of Montana
- Johnson, Jeffrey S., Associate Professor of Psychology, Ph.D., 2008, University of Iowa
- Johnson, Kenneth R., Emeritus Professor of Mathematics, Ph.D., 1980, University of Colorado
- Kaster, Jessica, Adjunct Professor of Psychology, Ph.D., 2004, University of North Dakota
- Kenyon, Mary Jo, Senior Lecturer of Biological Sciences, M.S., 1997, North Dakota State University
- Kilin, Dmitri, Associate Professor Chemistry, Ph.D., 2000, Chemnitz University of Technology
- Kilina, Svetlana, Associate Professor of Chemistry and Biochemistry, Ph.D., 2007, University of Washington

- Killilea, S. Derek, Professor Emeritus of Chemistry and Biochemistry, Ph.D., 1972, National University of Ireland, Galway, Ireland
- Kim, Jiha, Assistant Professor of Biological Sciences, Ph.D., 2006, University of Georgia
- Kolka, Randall, Adjunct Professor of Biological Sciences, Ph.D., 1996, University of Minnesota
- Kornfeld, Isaac, Emeritus Professor of Mathematics, Ph.D., 1975, Tashkent State University, Uzbekistan
- Kroll, Daniel, Emeritus Professor of Physics, Ph.D., 1973, University of Chicago
- Kryjevskaja, Liudmila, Associate Professor of Physics and School of Education, Ph.D., 2008, University of Washington
- Kryjevski, Andrei, Associate Professor of Physics, Ph.D., 2004, University of Washington
- Kureczko, Maxx, Lecturer of Mathematics, M.S., 2010, New Mexico Institute of Mining and Technology
- Laabs, Benjamin C., Associate Professor of Geology, Ph.D., 2004, University of Wisconsin-Madison
- Langley, Linda, Associate Professor of Psychology, Ph.D., 1998, University of Minnesota
- Larsen, Gerald L., Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1980, North Dakota State University
- Leontyev, Alexey, Assistant Professor of Chemistry and Biochemistry, Ph.D., 2015, University of Northern Colorado
- Leopold, Roger A., Adjunct Professor of Biological Sciences, Ph.D., 1967, Montana State University
- Lepper, Kenneth, Professor of Geology, Ph.D., 2001, Oklahoma State University
- Lexvold, Andrew, Lecturer of Statistics, M.S., 2016, North Dakota State University
- Liu, Guodong, Associate Professor of Chemistry and Biochemistry, Ph.D., 2001, Hunan University, China
- Linz, George M., Adjunct Professor of Biological Sciences, Ph.D., 1981, North Dakota State University
- Littmann, Friedrich, Professor of Mathematics, Department Chair, Ph.D., 2003, University of Illinois at Urbana-Champaign
- Lukat-Rodgers, Gudrun, Research Professor of Chemistry and Biochemistry, Ph.D., 1985, Iowa State University
- Magel, Rhonda, Professor of Statistics; Department Chair, Ph.D., 1982, University of Missouri-Rolla
- Marry, Andrew M., Adjunct Professor of Biological Sciences, Ph.D., 1998, John Innes Centre
- Martin, William O., Emeritus Professor of Mathematics, Ph.D., 1993, University of Wisconsin - Madison
- Mathsen, Ronald M., Emeritus Professor of Mathematics, Ph.D., 1965, University of Nebraska
- May, Sylvio, Professor of Physics, Department Chair, Ph.D., 1996, Friedrich Schiller University
- McCarthy, Gregory J., Distinguished Professor of Chemistry and Biochemistry, Adjunct Professor of Geology, Ph.D., 1969, Pennsylvania State University
- McCaul, Kevin D., Emeritus Dean, Emeritus Professor and Dale Hogoboom Professor of Psychology, Ph.D., 1978, University of Kansas
- McCourt, Mark, Dale Hogoboom Professor of Psychology, Ph.D., 1982, University of California, Santa Barbara
- McEwen, Daniel C., Adjunct Professor of Biological Sciences, Ph.D., 2008, North Dakota State University
- Meidinger, Alfred, Adjunct Professor of Physics, Ph.D., 2000, North Dakota State University
- Mitchell, James E., Adjunct Professor of Psychology, M.D., 1972, Northwestern University
- Momsen, Jennifer L., Professor of Biological Sciences, Ph.D., 2007, Rutgers University
- Montplaisir, Lisa M., Professor of Biological Sciences, Ph.D., 2003, University of Arizona
- Munski, Douglas, Adjunct Professor of Geosciences, Ph.D., 1978, University of Illinois at Urbana-Champaign
- Nawrot, Mark, James A. Meier Professor of Psychology, Department Chair, Ph.D., 1991, Vanderbilt University
- Nelson, Carolyn C., Emeritus Senior Lecturer of Mathematics, M.S., 1960, North Dakota State University
- Nelson, Gilbert W., Emeritus Professor of Mathematics, M.S., 1958, North Dakota State University
- Nickell, Gary S., Adjunct Professor of Psychology, Ph.D., 1982, Oklahoma State University
- Novozhilov, Artem S., Associate Professor of Mathematics, Ph.D., 2002, Moscow State University of Railway Engineering
- Nuechterlein, Gary L., Emeritus Professor of Biological Sciences, Ph.D., 1980, University of Minnesota
- Nyachwaya, James, Associate Professor of Chemistry and Education, Ph.D., 2012, University of Minnesota
- Oduor, Peter, Professor of Geology, Ph.D., 2004, University of Missouri - Rolla
- Oleson, Arland E., Emeritus Professor of Biochemistry and Biochemistry, Ph.D., 1963, University of Minnesota
- Olson, Lloyd D., Emeritus Professor of Mathematics, M.Ed., 1954, North Dakota State University
- O'Neill, George P., Adjunct Professor of Psychology, Ph.D., 1974, Georgia State University
- O'Neill, H.K., Adjunct Professor of Psychology, Ph.D., 1991, University of North Dakota
- Orr, Megan, Associate Professor of Statistics, Ph.D., 2012, Iowa State University
- Otte, Marinus L., Professor of Biological Sciences, Ph.D., 1991, Vrije Universiteit of Amsterdam
- Parent, Alexander, Assistant Professor of Chemistry and Biochemistry, Ph.D., 2013, Yale University
- Park, Ernest, Adjunct Professor of Psychology, Ph.D., 2003, Michigan State University
- Peterka, John J., Emeritus Professor of Biological Sciences, Ph.D., 1964, University of Minnesota
- Pokhodnya, Konstantin, Adjunct Professor of Chemistry and Biochemistry and Physics, Ph.D., 1977, Moscow Institute of Physics and Technology

- Pourhashem FakharLangeroudi, Ghasideh, Assistant Professor of Coatings and Polymeric Materials, Ph.D., 2014, Drexel University
- Provder, Theodore, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1965, University of Wisconsin
- Puyear, Robert L., Emeritus Professor of Biological Sciences, Ph.D., 1964, Oregon State University
- Quadir, Mohiuddin, Assistant Professor of Coatings and Polymeric Materials, Ph.D., 2010, Free University Berlin, Berlin, Germany
- Rao, M. Bhaskara, Emeritus Professor of Statistics, Adjunct Professor of Mathematics, Ph.D., 1973, Indian Statistical Institute, India
- Rasmussen, Seth C., Professor of Chemistry and Biochemistry, Ph.D., 1994, Clemson University, South Carolina
- Rasulev, Bakhtiyor, Assistant Professor of Coatings and Polymeric Materials, Ph.D., 2002, Uzbek Academy of Science, Uzbekistan
- Reindl, Katie M., Associate Professor of Biological Sciences, Ph.D., 2006, North Dakota State University
- Reiser, Mary, Adjunct Professor of Biological Sciences, Ph.D., 1988, Arizona State University
- Richardson, J.L., Adjunct Professor of Geosciences, Ph.D., 1974, Iowa State University
- Robinson, Michael D., James A. Meier Professor of Psychology, Ph.D., 1996, University of California-Davis
- Rock, Jessie, Lecturer of Geology, M.S., 2009, North Dakota State University
- Rodgers, Kenton R., Professor of Chemistry and Biochemistry, Ph.D., 1988, University of Iowa
- Roesler, Richard R., Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1969, University of Washington
- Rokke, Paul D., Emeritus Professor of Psychology, Ph.D., 1985, University of Houston
- Rudesill, James T., Emeritus Professor of Chemistry and Biochemistry, Ph.D., 1957, Purdue University
- Saini-Eidukat, Bernhardt, Professor of Geology, Ph.D., 1991, University of Minnesota
- Sawicki, Charles A., Emeritus Associate Professor of Physics, Ph.D., 1975, Cornell University
- Schwert, Donald P., Emeritus Professor of Geology; Ph.D., 1978, University of Waterloo, Canada
- Scoby, Donald R., Emeritus Professor of Biological Sciences, Ph.D., 1968, North Dakota State University
- SenGupta, Indranil, Associate Professor of Mathematics, Ph.D., 2010, Texas A&M University
- Shappell, Nancy, Adjunct Professor of Biological Sciences, Ph.D., 1988, Virginia Polytechnic University
- Shen, Gang, Associate Professor of Statistics, Ph.D., 2009, Purdue University
- Shreve, Warren E., Emeritus Professor of Mathematics, Ph.D., 1967, University of Nebraska
- Sibi, Mukund P., Distinguished and James A. Meier Professor of Chemistry and Biochemistry, Ph.D., 1980, City University of New York
- Signor, Sarah, Assistant Professor Biological Sciences, Ph.D., 2013, University of California, Davis
- Sinha, Mahendra K., Emeritus Professor of Physics, Ph.D., 1961, Pennsylvania State University
- Sinha, Sangita, Professor of Chemistry and Biochemistry, Ph.D., 2000, Purdue University
- Skerry, Brian, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1980, University of Manchester, U.K.
- Slanger, William D., Adjunct Professor of Statistics, Ph.D., 1975, Cornell University
- Smith, Matthew T., Associate Professor of Practice of Biological Sciences, Ph.D., 2012, University of Arkansas
- Sovada, Marsha A., Adjunct Professor of Biological Sciences, Ph.D., 1993, North Dakota State University
- Sparks, Robert B., Emeritus Associate Professor of Chemistry and Biochemistry, Ph.D., 1972, University of South Dakota
- Stockwell, Craig A., James A. Meier Professor of Biological Sciences, Ph.D., 1995, University of Nevada, Reno
- Striker, Jessica, Associate Professor of Mathematics, Ph.D., 2008, University of Minnesota
- Sun, Wenfang, Walter F. Verna Gehrts and James A. Meier Professor of Chemistry and Biochemistry, Ph.D., 1995, Institute of Photographic Chemistry, Chinese Academy of Science
- Suttle, Jeffrey C., Adjunct Professor of Biological Sciences, Ph.D., 1979, Michigan State University
- Sweetman, John, Assistant Professor of Biological Sciences, Ph.D., 2006, Queen's University
- Swenson, Rodney, Adjunct Professor of Psychology, Ph.D., 1985, University of North Dakota
- Swenson, Orven F., Emeritus Associate Professor of Physics, Ph.D., 1982, Air Force Institute of Technology
- Tackett, Lydia S., Associate Professor of Geology, Ph.D., 2014, University of Southern California
- Tallman, Dennis E., Emeritus Professor of Chemistry and Biochemistry and Coatings and Polymeric Materials, Ph.D., 1968, Ohio State University
- Thomas, Laura E., Associate Professor of Psychology, Ph.D., 2008, University of Illinois
- Travers, Steven E., Associate Professor of Biological Sciences, Ph.D., 1998, University of California, Santa Barbara
- Tucker, Robert, Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1967, Iowa State University
- Ungar, Abraham A., Professor of Mathematics, Ph.D., 1973, Tel Aviv University, Israel
- Vick, Brady A., Adjunct Professor of Chemistry and Biochemistry, Ph.D., 1975, North Dakota State University
- Vinograd, Robert E., Emeritus Professor of Mathematics, Ph.D., 1952, Moscow State University, D.Sc., 1960, Moscow State University, Russia
- Voronov, Andriy, Professor of Coatings and Polymeric Materials, Ph.D., 1994, Lviv Polytechnic Institute, Ukraine
- Wagner, Alexander, Associate Professor of Physics, Ph.D., 1997, Oxford University
- Wallin, Kimberly, Dean, Ph.D., 2002, University of Wisconsin-Madison

- Webster, Dean C., Professor of Coatings and Polymeric Materials, Department Chair, Ph.D., 1984, Virginia Polytechnic Institute and State University
- White, Alan R., Adjunct Professor of Biological Sciences, Ph.D., 1981, University of North Carolina
- Wilkinson, John C., Associate Professor of Chemistry and Biochemistry, Ph.D., 2001, Vanderbilt University
- Windels, Steve K., Adjunct Professor of Biological Sciences, Ph.D., 2008, Michigan Technological University
- Wisenden, Brian, Adjunct Professor of Biological Sciences, Ph.D., 1993, University of Western Ontario
- Wissman, Kathryn, Assistant Professor of Psychology, Ph.D., Kent State University
- Withnell, Gary D., Adjunct Professor of Physics, Ph.D., 1980, North Dakota State University
- Wonderlich, Stephen A., Adjunct Professor of Psychology, Ph.D., 1985, University of Missouri
- Wood, Scott A., Professor of Geology, Ph.D., 1985, Princeton University
- Van Amburg, Gerald L., Adjunct Professor of Biological Sciences, Ph.D., 1969, Texas A&M University
- Yang, Zhongyu, Associate Professor of Chemistry and Biochemistry, Ph.D., 2010, University of Pittsburgh
- Yuan, Mingao, Assistant Professor of Statistics, Ph.D., 2018, Purdue University
- Zhao, Pinjing, Professor of Chemistry and Biochemistry, Ph.D., 2003, Cornell University

Academic Departments

A

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Department of Accounting and Information Systems

Undergraduate Programs of Study

- Accounting (major, minor)
- Fraud Investigation (minor)
- Management Information Systems (major, minor)

Graduate Programs of Study

- Accountancy
- Business Analytics

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Accountancy (M.Acc.)
- Master of Science in Business Analytics (M.S.B.A.)

Department Description

The Department of Accounting and Information Systems offers majors in Accounting and Management Information Systems. Students majoring in either of these majors find employment in a broad range of industries, as well as government and not-for-profit organizations.

Department Accreditation

The Accounting and Information Systems Department is accredited through the College of Business by the Association to Advance Collegiate Schools of Business (<https://www.ndsu.edu/business/about/aacsb/>), which places it in the top 5 percent of business schools worldwide.

Practicum (Internship) Requirement

Accounting and Management Information Systems majors are required to complete a three-credit practicum (internship) experience while enrolled in the professional program. This requirement prepares the student for the accounting or management information systems world through practical experience in their primary area of study. Students must consult with their faculty advisor and obtain approval prior to enrolling in the practicum.

Department of Aerospace Studies (Air Force - ROTC)

Department Information

- www.ndsu.edu/afrotc/ (<http://www.ndsu.edu/afrotc/>)

Undergraduate Programs of Study

- Aerospace Studies (minor)

Department Description

The Air Force Reserve Officer's Training Corps (AFROTC) program is conducted by the Department of Aerospace Studies. The purpose of this program is to enable qualified undergraduate and graduate students to become commissioned officers in the United States Air Force or Space Force.

AFROTC learning experiences will be of long-range value whether one pursues a military or civilian career. Upon graduation and completion of the AFROTC curriculum, each student is commissioned a second lieutenant in the United States Air Force or Space Force.

The initial assignment options available to the Air Force or Space Force second lieutenant include the following:

1. Enter the Air Force or Space Force and complete the designated technical training course prerequisite to the student's specialty, i.e., flight training, research and development, management, or support functions.
2. Apply for a delay in entering active duty for the purpose of pursuing an advanced degree.
3. Enroll in one of several Air Force sponsored graduate study programs while serving with full pay as an Air Force or Space Force officer.

The Aerospace Studies curriculum is divided into two courses of instruction: the General Military Course (GMC), which parallels the freshman and sophomore academic years, and the Professional Officer Course (POC), which parallels the junior and senior academic years. Students in the four-year program normally attend four weeks of field training at Maxwell AFB, AL during the summer between their sophomore and junior years. For highly-qualified students or those with some military experience, a three-year program is available.

AFROTC college scholarships are awarded to the best-qualified students and range in length from one to five years. These grants cover the cadet's tuition, incidental lab fees and most textbooks. In addition, cadets receive a tiered monthly allowance. For example, cadets enrolled in the Professional Officer Corps (POC) receive \$450 per month during their junior academic year and \$500 per month during their senior academic year. Incentive scholarships also are available for students not already on scholarship.

For more information on Air Force ROTC admission requirements and career opportunities, please contact the Unit Admissions Officer at 701-231-8186.

Department of Agribusiness and Applied Economics

Department Information

- www.ag.ndsu.edu/agecon/ (<http://www.ag.ndsu.edu/agecon/>)

Undergraduate Programs of Study

- Agribusiness (major, minor)
- Agricultural Economics (major)
- Economics (major, minor)

Graduate Programs of Study

- Agribusiness and Applied Economics
- International Agribusiness

Degree Offered

- Bachelor of Science Degree (B.S.)
- Bachelor of Arts Degree (B.A.) (Economics Standard option only)
- Master of Science (M.S.)

Department Description

Each of the programs is based on the same fundamental economic concepts and theory, but each program offers students an opportunity to focus their studies on their individual interests. Economic theory provides a systematic and logical framework for analyzing how a society solves the problem of scarcity in deciding what goods and services to produce, how to organize production, and for whom goods and services are to be produced. Knowledge of economics is necessary to understand and deal with topics such as economic growth, monetary systems, international trade, inflation, risk analysis and management, unemployment, government finance, and various forms of market regulation.

As global population grows and the world's economies become more interdependent, economic principles become increasingly important when analyzing economic relationships, solving problems, and pursuing opportunities among nations and economies throughout the world.

In each major, students study communication, mathematics, science and computer skills. Introductory and intermediate courses in economics address

1. microeconomics theory, which is the study of relative prices, the consequences of different market forms, and consumer behavior, and
2. macroeconomic theory, which includes the study of the general level of prices, employment, and output.

Students whose studies are based on economic concepts are in high demand. Employers recognize the need to understand global trends in order to contribute to private and public economic decisions. Agribusiness, Agricultural Economics and Economics majors are employed in virtually every area of the economy. In banks and financial institutions, they forecast market activity, exchange rates, and interest rate movements. In industrial firms, they forecast sales, evaluate changes in cost conditions, analyze changes in international economic conditions, and provide data needed for critical decisions. Governments are among the largest employers of economists because agencies rely on the skills of these professionals to evaluate and review proposed projects and policies.

Virtually no other academic major offers the diversity in employment opportunities and flexibility among careers, as does the study of economic concepts and their application in problem solving and decision making. A background in economics provides students with a set of versatile skills that will not become obsolete with the introduction of new technology. Each program, as described in the following sections, includes opportunities for students to study additional disciplines.

Department of Agricultural and Biosystems Engineering

Department Information

- www.ndsu.edu/aben (<http://www.ndsu.edu/aben/>)

Undergraduate Programs of Study

- Agricultural and Biosystems Engineering (major)
- Agricultural Systems Management (major and minor)
- Precision Agriculture (major and minor)

Graduate Programs of Study

- Agricultural & Biosystems Engineering

Degrees Offered

- Bachelor of Science Degree (B.S.)
- Bachelor of Science in Agricultural and Biosystems Engineering (B.S.A.B.En.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The mission of the Department of Agricultural and Biosystems Engineering at North Dakota State University is to serve students and our profession by providing quality educational programs that prepare graduates for 21st century living and career opportunities. The programs are designed to provide education, research, and effective extension programs that help people improve their lives through the educational process using research-based knowledge focused on issues and needs. Agricultural and Biosystems Engineering strives to generate new knowledge in engineering and allied technologies for production agriculture, the food system, and related environmental resources.

Agricultural and Biosystems engineers apply their engineering skills towards sustainable production of food, feed, fiber, and fuel; the necessities of life. Agricultural Systems Management program prepares men and women for careers requiring integration and application of engineering technology, agricultural and biological sciences, and business to manage resources and systems for producing, processing, and marketing food and other biological products worldwide. Precision Ag program prepares our graduates to address profitability, production efficiency and environmental stewardship related to modern high-tech agricultural production.

Our students are active in a variety of extra-curricular programs (https://www.ndsu.edu/aben/student_clubs/).

Department of Allied Sciences

Department Information

- www.ndsu.edu/alliedsciences/ (<http://www.ndsu.edu/alliedsciences/>)

Undergraduate Programs of Study

- Medical Laboratory Science (major)
- Radiologic Sciences (major); subplans in radiography, echocardiography, or diagnostic medical sonography
- Respiratory Care (major)

Degrees Offered

- Bachelor of Science Degree (B.S.)

Department Description

The Department of Allied Sciences offers three undergraduate majors leading to a Bachelor of Science degree: medical laboratory science (MLS), radiologic sciences (RS), and respiratory care (RC). The department's mission is to prepare its graduates with the knowledge, skills, and professional traits necessary to become competent, compassionate, and contributing professionals in their allied sciences career choice. In support of this mission, the department and its affiliated hospital program educational partners offer a curriculum that promotes the development of a graduate who thinks critically, whose behavior is guided by ethical and professional values, and who is prepared for lifelong learning and leadership in their profession.

The Programs

A Bachelor of Science, MLS major, includes three years of academic courses on campus followed by an 11-12 month full-time professional-level internship within an affiliated hospital's MLS program. During the internship, students complete classes and clinical education specific to the practice of a medical laboratory scientist. All affiliated hospital programs are accredited by the National Accrediting Agency for Clinical Laboratory

Science (NAACLS). Graduates are eligible to take the national certifying exam administered by the American Society for Clinical Pathology Board of Certification (ASCP BOC) to earn the MLS credential.

A Bachelor of Science, RS major, includes two or more years of academic courses on campus followed by a two-year full-time professional internship within a hospital-based program affiliated with NDSU. Three unique and specialized internships are available to NDSU RS majors: radiography (x-ray), diagnostic medical sonography (general and vascular sonography), and echocardiography (cardiac sonography). Each internship focuses on applied classes and clinical education that prepares the graduate to work in their respective specialty area. Affiliated hospital-based programs in radiologic technology/radiography are accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). RS radiography graduates are eligible to take the national certifying exam administered by the American Registry of Radiologic Technologists to earn the RT(R) credential. Echocardiography and diagnostic medical sonography internships are offered through an affiliation with Sanford Medical Center, Fargo, N.D. SMCF's sonography programs are accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). Sonography graduates are eligible to take national certifying exams appropriate to their specialization and administered by the American Registry for Diagnostic Medical Sonography (ARDMS).

A Bachelor of Science, RC major, includes two to three years of academic courses on campus and a 15-month full-time professional-level internship at Sanford Medical Center, Fargo, ND. Internship class and clinical education is specifically applied to the practice of respiratory care. The NDSU/Sanford Respiratory Care program is accredited by the Commission on Accreditation for Respiratory Care (CoARC). Graduates are eligible to complete a series of national certifying exams that lead to the registered respiratory therapist (RRT) credential.

Students interested in MLS, RC and/or RS should plan to meet with an allied sciences academic advisor while exploring career options and upon declaring an allied sciences major to create an individualized plan of study for successful completion of degree requirements.

Department of Animal Sciences

Department Information

- www.ag.ndsu.edu/ansc (<http://www.ag.ndsu.edu/ansc/>)

Undergraduate Programs of Study

- Animal Science (major, minor)
- Equine Science (major, minor)
- Equine Assisted Activities & Therapies (minor)
- Large Animal Veterinary Technology (minor for Veterinary Technology majors)
- Veterinary Technology (major)

Graduate Programs of Study

- Animal Science

Degrees Offered

- Bachelor of Science Degree (B.S.)
- Master of Science Degree (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The mission of the NDSU Department of Animal Sciences is to generate and share knowledge about the health and welfare of animals, the products they produce, and the roles they play in improving human lives. Each of the three major program areas are based on the same fundamental principles—biology and husbandry of animals—but each offer students an opportunity to focus their individual interests.

The faculty and staff are dedicated to providing students with up-to-date information regarding the latest techniques in animal husbandry, welfare, production, business, biology, communication, nursing, training, and meat science. Besides taking courses, students have the opportunity to obtain specific skills and develop contacts during internships in industry or research.

Pre-veterinary school course work: Necessary coursework for meeting entrance requirements of veterinary schools can be taken while majoring in Animal Science, Equine Science, or Veterinary Technology. Working with an academic adviser to meet entrance requirements is important.

Transfer Credits: Transfer courses with grade 'C' or better will be accepted for Animal Science, Equine Science, and Veterinary Technology courses in the major.

Department of Apparel, Merchandising, Interior Design, and Hospitality Management

Department Information

- www.ndsu.edu/adhm (<http://www.ndsu.edu/adhm/>)

Undergraduate Programs of Study

- Apparel, Retail Merchandising and Design (major, minor, certificate)
- Hospitality and Tourism Management (major, minor)
- Interior Design (major, minor)

Degrees Offered

- Bachelor of Arts Degree (B.A.)
- Bachelor of Science Degree (B.S.)
- Undergraduate Certificate

Department Description

Our programs are professionally based with elements of design, technology, and management interlaced into the coursework. Our programs have a strong general education component and specialized career preparation.

The Programs

Apparel, Retail Merchandising and Design (ARMD)

Apparel, Retail Merchandising and Design prepares students with the knowledge and skills to work in both the retail and product design/development areas of the fashion industry. Students choose one of the three options - fashion product development, fashion entrepreneurship, and retail merchandising. Graduates are able to have challenging careers that build on their particular interests. For example, graduates hold positions as production developers, visual merchandisers, technical designers, buyers, sourcing specialists, social media marketing specialists, fashion forecasters, stylists, store managers, and interior merchandisers with such companies as Target, Kohl's, Scheels, Evereve, Best Buy, Nordstrom, The Gap, The Buckle, Nike, Forever 21, Old Navy, and Duluth Trading Company, to name a few. ARMD also offers a minor.

Hospitality and Tourism Management (HTM)

The Hospitality and Tourism Management major prepares students to be professionals who can lead teams of people and effectively manage hospitality operations in lodging, foodservice, events, travel, and tourism. Graduates hold a wide variety of positions such as hotel or restaurant managers or supervisors, event planners and specialists, sales coordinators or directors, digital marketing and social media coordinators, service managers, recruiters and human resource specialists, and flight attendants to name a few. Our students learn and develop leadership skills by completing coursework that increases knowledge of the industry, develops people management skills, and enhances problem-solving abilities while instilling a sense of responsibility and professionalism. The program incorporates a required minor in Business Administration. We offer the only four-year HTM program in North Dakota accredited by the Accreditation Commission for Programs in Hospitality Administration. HTM also offers a minor.

Interior Design (ID)

The Interior Design major is a professional program that prepares students for a career as an interior designer. Professional interior designers create functional, safe, and attractive interior environments, including those found in restaurants, hospitals, museums, shopping centers and homes. Successful designers know the theory and science of design, drawing and computer-aided design, safety regulations, and how to read construction drawings. Our program provides coursework and experiences that develop these skills and is accredited by the Council for Interior Design Accreditation (CIDA) and the National Association of Schools of Art and Design (NASAD).

For more information about any of the programs, contact the department. We advise new and transfer students to contact the department prior to beginning their college work.

Enrichment Opportunities

Experiential Learning

Course work in the department includes hands-on experiences through labs, studio classes, and simulations. Our programs also supplement classroom learning through structured field experiences to architectural firms, hospitality operations, fashion, retail, and design centers. Study tours to cities such as Los Angeles, New York City, Minneapolis, Chicago, and to several countries, such as England, France, the Netherlands, and Italy, are scheduled regularly.

Student Organizations

All three majors in the ADHM Department host active student organizations. The student organizations provide students with extra opportunities outside the classroom such as industry speakers, field trips to view workplaces, chances to work on service-learning projects to help others, and the experience of planning large events related to their field of interest. The ARMD student organization is Fashion, Apparel & Business Organization (FABO). FABO is a student organization and its purpose is to give students a practical perspective/overview of careers and opportunities related to the apparel design and fashion fields. FABO brings in speakers and organizes field trips and other activities to provide interaction with professionals. In addition, they plan and implement an annual spring fashion show for the whole campus. The HTM student organization is the Hospitality Student Association (HSA). The annual Food and Wine Show is HSA's biggest event. Funds raised go towards a scholarship fund and to support organization activities, industry tours, and projects for the following year. The ID student organization is the student chapter of the national professional organization, the American Society of Interior Design (ASID). Students participate in local and regional design events that include the annual North Dakota Interior Designers' Showcase (NDID). They compete biennially in CANstruction® to support the regional food bank. These students plan a trip to a place of interest each year. They have gone to Minneapolis and Chicago in recent years.

Fashion Institute of Technology Affiliation

Professional enrichment is possible through affiliation with the Fashion Institute of Technology (F.I.T.). The ARMD program has an arrangement with the Fashion Institute of Technology (F.I.T.), New York City, where a qualified student may attend that institution for a semester or a full year as a visiting student. Summer School opportunities are also available. The approved credits earned at F.I.T. will transfer to NDSU and will count toward graduation requirements. Students participating in the one-year visiting student program earn an associate degree from F.I.T.

During the second year of study at NDSU, interested ARMD students should consult with their advisers to ensure full consideration of their application for the F.I.T. visiting student program. Application should be made at least one year in advance.

Architecture

Undergraduate Programs of Study

- Architecture (major)

Graduate Programs of Study

- Architecture

Degrees Offered

- Bachelor of Science in Architecture (B.S.Arch.)
- Master of Architecture (M.Arch.)

Architecture is a fine art devoted to the design of the human environment. The architect is concerned with the aesthetic, social, environmental, technological and psychological factors that influence the design of a building. Architects are involved in the success, quality and appearance of a building within the context of a community and the city. Architecture is a dynamic profession that ranges from residential houses to large-scale urban buildings. An architect can design houses, commercial buildings, museums, college science buildings, and resorts, as well as many other building types.

BACKGROUND INFORMATION

To become an architect, you must learn to make use of science and technology, and develop sensitivity for beauty in the design of space and form with material. You must develop a deep understanding of people and their surroundings. Because this work encompasses so many different fields of interest, the architect is best thought of as a professional who bridges different areas of study and blends them into a single, significant activity.

CAREER OPPORTUNITIES

Architects work in architectural firms or accept positions with government, corporations or institutions. Some architects become highly specialized; others remain generalists in the profession, working on all facets of a project. Whichever path your career may follow, it is necessary to first build a firm background that includes essential architectural knowledge and skills. Architecture provides a variety of interesting positions within the discipline. One can either work for an established architecture firm or create their own business. There are three typical areas in architecture which one can focus on (or one can do all three) once they begin working. These three areas are: the design or aesthetic aspects of a project, the technical or material aspects of a project, or as the construction liaison when a project is being built. Further, architecture is a scalable profession depending on one's interests. For example, the possible areas one can work in range from small-scale residential houses to large-scale skyscrapers.

ACCREDITATION

The five-year Master of Architecture degree is fully accredited by the National Architectural Accreditation Board (NAAB). For more information see, www.naab.org/home. To become a licensed architect requires an accredited professional degree, completion of the Architectural Experience Program (AXP) and passing your state's licensing examination.

THE PROGRAM

The architecture program is a five-year professional course of study leading to a Master of Architecture degree. This degree is nationally accredited and recognized by all state architectural licensing boards. Students receive a Bachelor of Science in Architecture, a pre-professional degree, at the end of four years. During the first year of pre-architectural studies, the curriculum addresses the understanding of the environment and our impact on nature. In addition to meeting general education and departmental requirements students take five environmental design courses (ENVD) comprised of lecture courses, a drawing course and a design fundamentals course. Beginning at the sophomore level, there is a selective admissions process where admitted students become architecture majors. We limit our studio courses to a maximum of 16 students to maintain a high level of student faculty contact. The program is a studio based model of education where students have high contact hours with their professors and learn problem solving techniques and design methodologies. The primary focus is on design thinking where students engage in individual and group projects that represent a vast array of design problems that require real-world solutions. Our primary focus is for students to learn to be great designers and leaders who engage the dynamic and emerging problems of the world with beautiful and thoughtful designs. Students will learn how to communicate their ideas through writing and public speaking in addition to traditional and new ways of thinking and communicating such as physical models, drawings, computer animation and renderings and virtual reality. The program has required field trips, a lecture series and invited outside professionals that help students focus on their own interests in architecture and create a project based on those interests.

ACTIVITIES AND FACILITIES

Activities within the department include:

- Student chapters of the American Institute of Architecture Students; Tau Sigma Delta; Freedom by Design; U.S. Green Building Council; National Organization of Minority Architects
- Yearly career fair
- Student-run Beaux Arts Ball with a guest speaker
- Interaction with community projects such as eFargo
- Studio field trips to U.S. cities
- Visiting lecturers who speak on architecture and related topics
- Joint studio projects with the landscape architecture program
- Semester-long term abroad
- Summer study opportunities in Europe and North America and an International Student Exchange Program
- Summer internship opportunities

Our facilities include:

- Two remarkable buildings located in downtown Fargo: Klai Hall and Renaissance Hall
- 3-D prototyping and printing
- 3-D computing rendering and server farm
- State-of-the-art computing labs
- Computer aided laser cutters and CNC
- Large document printers and scanners
- Software such as GIS, CAD and 3-D rendering and modeling
- An Architecture and Landscape Architecture Library of about 18,000 books, 70 magazine subscriptions and 36,000 slides
- Photographic and graphic reproduction equipment
- Individual studio spaces in the second through fifth years

HIGH SCHOOL PREPARATION

We suggest that students take high school courses in digital drawing and animation, an art class, such as drawing from life, and math and science courses such as calculus, trigonometry and physics. If possible, we encourage high school students to take advance placement or college credit courses that could be substitutes for North Dakota State University General Education requirements.

TRANSFER STUDENTS

Transfer applicants are required to enter the architecture program at the first-year level. Five years of study are required for completion of the degree. Advanced standing is possible through a portfolio and transcript review process.

SELECTIVE ADMISSION

Approximately 64 architecture majors are selected for admission into the second year of the program. A student's eligibility is based on their overall grade point average (GPA) and their GPA for pre-architecture courses with the ENVD prefix. It is important to apply early, complete all freshman courses in the first year and maintain a solid academic record. Students must have a minimum 3.0 GPA to apply to the graduate school during the third or fourth year of the program.

SPECIAL NOTICE

Students in the second year of the program will be required to purchase a laptop computer. Information on type of computer, software, purchase, and financing arrangements will be distributed to students prior to purchase.

Department of Biological Sciences

Department Information

- www.ndsu.edu/biology (<http://www.ndsu.edu/biology/>)

Undergraduate Programs of Study

- Biological Sciences (major, minor)
 - Emphasis in Ecology and Conservation Science
 - Emphasis in Biomedical Science
 - Emphasis in Environmental Science
- Botany (minor)
- Zoology (minor)

Graduate Programs of Study

- Biological Sciences
- Cellular & Molecular Biology
- Environmental & Conservation Services
- Genomics and Bioinformatics
- STEM Education

Degrees Offered

- Bachelor of Arts Degree (B.A.)
- Bachelor of Science Degree (B.S.)
- Master of Science Degree (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The Department of Biological Sciences offers broad undergraduate preparation in the foundational concepts and principles of the life sciences with an emphasis on scientific discovery and research. Our students are prepared for a wide variety of life science careers and continue onto professional programs in the medical sciences, as well as wildlife and conservation science. It is important for students to consult frequently with their advisers regarding the proper courses related to their special interests. In addition, students should correspond early with professional or graduate schools to make sure they satisfy specific requirements.

Curricula for secondary school biological sciences education, comprehensive science education, environmental studies, traditional course sequences, and pre-professional programs are available in the department. Graduate work in biology is offered at the Master of Science and Doctor of Philosophy levels.

Department of Chemistry and Biochemistry

Department Information

- www.ndsu.edu/chemistry (<http://www.ndsu.edu/chemistry/>)

Undergraduate Programs of Study

- Biochemistry and Molecular Biology (major, minor)
- Chemistry (major, minor)

Graduate Programs of Study

- Chemistry
- Biochemistry

Degrees Offered

- Bachelor of Arts Degree (B.A.)
- Bachelor of Science Degree (B.S.)
- Master of Science Degree (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Chemistry, widely regarded as a central science, involves the study of the properties and transformations of matter at a molecular level. A very wide range of consumer products, including plastics, personal care products, pharmaceuticals, etc. owe their development at least partially to modern chemistry. Chemists work in industry, educational institutions, and government laboratories, developing new materials, new pharmaceutical, improved chemical analysis methods, etc.

Biochemistry and molecular biology involve the interdisciplinary study of the chemical and physical properties of living systems and the chemical changes that take place in living organisms. Careers in biochemistry and molecular biology require preparation in chemistry and biology, as well as biochemistry and molecular biology. This is a rapidly advancing field, with many recent developments in the unraveling of the genetic code, forensic science, bioinformatics, etc. This field plays a central role in advances in human health.

Students beginning study in these programs should have a strong high school background in science and mathematics.

Graduate study is available in Chemistry (M.S. and Ph.D. degrees), and Biochemistry (M.S. and Ph.D. degrees). Students beginning study in these programs must have a strong undergraduate background in chemical science. For the Biochemistry graduate programs, prior training in the life sciences is desirable, but not essential. For more details, see the department web site (<https://www.ndsu.edu/chemistry/>) or the online Graduate Bulletin (p. 733).

Department of Civil, Construction and Environmental Engineering

Department Information

- www.ndsu.edu/ccee/ (<http://www.ndsu.edu/ccee/>)

Undergraduate Programs of Study

- Civil Engineering (major)
- Construction Engineering (major)
- Construction Management (major)
- Environmental Engineering (major)

Graduate Programs of Study

- Civil Engineering
- Construction Management
- Environmental Engineering

Degrees Offered

- Bachelor of Science in Civil Engineering (B.S.C.E.)
- Bachelor of Science in Environmental Engineering (B.S.Env.E.)
- Bachelor of Science in Construction Engineering (B.S.Con.E.)
- Bachelor of Science in Construction Management (B.S.Cons.M.)
- Master of Construction Management (M.Cons.M.)
- Master of Science (M.S.) and Ph.D. in Civil Engineering
- Master of Science (M.S.) in Environmental Engineering

Department Description

The mission of the Department of Civil, Construction and Environmental Engineering is to provide quality education to prepare nationally competitive undergraduate students for a successful career in civil and environmental engineering; to provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of civil and environmental engineering for graduate students; and to provide service to the university, engineering profession, and the public.

The following program educational objectives are consistent with the university, college, and department missions. Graduates of our undergraduate programs are expected within a few years of graduation to:

- Engage successfully in the practice of engineering to solve current and emerging problems.
- Conduct design in a manner that is ethical, includes diverse perspectives, and realizes the broader societal and sustainability implications of the design and decision-making process.
- Ascend to leadership roles within the workplace via initiative and responsible stewardship
- Advance their profession and communities through collaborative work, professional licensure, advanced degrees, lifelong learning, and engaged service

Civil engineering includes the planning, design, construction, maintenance, and operation of large and permanent projects of our civilization. Civil engineers are in demand wherever people need solutions to infrastructure problems. The major subdivisions of civil engineering at NDSU are structural, geotechnical, environmental, water resources, and transportation engineering. Civil Engineers are responsible for such projects as bridges, buildings, dams, and other river and harbor work, municipal water supply and sanitation facilities, streets, highways, and other transportation facilities. On many projects, civil engineers work in close cooperation with engineers and scientists from other fields. The Bachelor of Science degree in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Environmental engineering includes the integration and application of biological, chemical, and engineering principles to improve and sustain the environment for the protection of its ecosystems, human health, and environmentally-related enhancement of our quality of life. Environmental engineers focus on water and wastewater treatment system design and public health protection; traditional and emerging contaminant mitigation in water, soil, and air; ecological principles in the design process; green manufacturing; and, sustainable design. The Bachelor of Science degree in Environmental Engineering began accepting students in fall 2020.

Department of Coatings and Polymeric Materials

Department Information

- www.ndsu.edu/cpm (<http://www.ndsu.edu/cpm/>)

Undergraduate Programs of Study

- Coatings and Polymeric Materials (minor)

Department Description

The Department of Coatings and Polymeric Materials is internationally known for the excellence of its educational and research programs. Close ties with industry and government agencies are maintained to assure that teaching and research programs remain in step with the rapidly changing science and technology of the area.

Knowledge of polymers is a desirable foundation for a career as a professional chemist in industry. More than 80 percent of industrial chemists work with polymers, and many physicists and engineers also work with polymer-related materials.

Within the broad area of polymers, the department puts special emphasis on coatings. Coatings are so often encountered in everyday life that they may be taken for granted. Paint on walls, coatings on automobiles or aircraft, liners for the interior of beverage cans, coatings to protect bridges from corrosion, coatings on magnetic tapes and computer chips, and body implants are only a few selected examples.

Closely related fields are adhesives, printing inks, plastics, cosmetics, food, and biotechnology. Only five other universities in the U.S. offer programs in coatings and employment opportunities far exceed the number of graduates.

To encourage students to study in the field, companies and organizations fund undergraduate scholarships of up to \$2,500 a year. Scholarship applications are made through the online scholarship application system (<https://www.ndsu.edu/onestop/finaid/scholarships/>).

Undergraduates interested in polymers and coatings are encouraged to major in Chemistry (p. 202) or Mechanical Engineering (p. 505) (ME). Coatings and Polymeric Materials offers graduate level programs leading to the M.S. and Ph.D. degrees in Coatings and Polymeric Materials, or a Ph.D. in Materials and Nanotechnology.

The Coatings and Polymeric Materials minor (<https://bulletin.ndsu.edu/programs-study/undergraduate/coatings-polymeric-materials/>) provides excellent preparation for professional employment at the B.S. level and for graduate school. Students are strongly advised to plan their programs so that the entire coatings course can be taken during the same academic year. Chemistry majors with the CPM minor also are required to take CPM 473 Polymer Synthesis prior to graduation.

Department of Communication

Department Information

- www.ndsu.edu/communication (<http://www.ndsu.edu/communication/>)

Undergraduate Programs of Study

- Agricultural Communication (major, minor)
- Journalism (major, minor)
- Management Communication (major, minor)
- Strategic Communication (major, minor)

Degrees Offered

- Bachelor of Arts Degree (B.A.)
- Bachelor of Science Degree (B.S.)

Pre-Communication Preparation

Students interested in pursuing an undergraduate degree offered by the Department of Communication are enrolled as pre-professional majors. Student must complete all Pre-Communication courses with a GPA of at least 3.00 to be accepted into the professional program in their major.

Department of Computer Science

Department Information

- www.ndsu.edu/cs (<http://www.ndsu.edu/cs/>)

Undergraduate Programs Offered

- Computer Science (major, minor)
- Computer Science and Mathematics (double major)
- Computer Science and Physics (double major)

Graduate Programs Offered

- Computer Science (M.S. & Ph.D.)
- Software Engineering (Certificate, M.S., M.S.E. & Ph.D.)
- Computer Science Education (Certificate)
- Cybersecurity (Certificate)

Degrees Offered

- Bachelor of Arts Degree (B.A.)
- Bachelor of Science Degree (B.S.)
- Master of Science (M.S.)
- Master of Software Engineering (M.S.E.)
- Doctor of Philosophy (Ph.D.)
- Graduate Certificate

Department Description

The Department is located on the second floor of the Quentin Burdick Building along with the office of Information Technology Services. Computer Science has twenty-one faculty with interests in most areas of computer science. The Department has two dedicated student instructional laboratories, a cybersecurity laboratory, as well as ten research laboratories in which undergraduate and graduate students work together on a wide variety of research projects.

Graduates in computer science might choose a job in any of these areas: artificial intelligence, systems analysis, software development/engineering, security, information assurance, bioinformatics, data science, web development, networking, information system development, database management, cybersecurity, technical support, robotics, and automatic systems.

Graduates of the computer science program have recently accepted employment in major local and national businesses and industries. Many have chosen positions in North Dakota and adjoining states. With the wide use of computers and the Internet there is a growing need for computer

specialists within North Dakota, the region, and the nation. Graduates are typically offered attractive and competitive starting salaries. Placement rates are high, and job prospects are projected to grow dramatically in upcoming years.

To be prepared to enter the Computer Science program, a student should have the usual college preparatory courses including at least three years of mathematics. Courses that develop the ability to think logically, to organize, and to analyze are especially important.

Students who have taken college-level courses or who have computer experience can have their work evaluated for possible departmental advanced placement. The results of an Advanced Placement test (<https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/credit-by-examination/>) may be used also.

Advisors will provide students with personal attention in formulating programs with personal attention tailored to the interests and abilities of the individual student. For students with no computer experience, introductory courses are offered in the standard curriculum for majors. The university has a military transfer guide in computer science. It is possible for advanced undergraduate students to take graduate courses while completing the undergraduate program.

Department of Criminal Justice

Undergraduate Programs of Study

- Criminal Justice (major, minor)
- Fraud Investigation (minor)

Graduate Programs of Study

- Criminal Justice

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Our department serves approximately 250 undergraduate students and 20 graduate students. The department offers a bachelor's degree and minor in criminal justice and both an M.S. in criminal justice and a Ph.D. in criminal justice. Undergraduate criminal justice students in their junior year may apply to our accelerated master's program. This program allows exceptional undergraduate students to complete the master's degree in 3 semesters after completion of the bachelor's degree by taking select coursework which counts for credit in both the bachelor's and master's degrees.

About the Faculty

Our five full-time faculty members in the department represent a wide array of expertise, focusing on policing, corrections, theories of crime, and juvenile justice, to name a few.

Career Paths for our Students

Students graduating with a degree in criminal justice have found rewarding careers in policing, federal law enforcement, conservation law enforcement, parole and probation, corrections, crime analysis, and victim advocacy.

In sum, the content knowledge, the analytical and communication skills, and the capacity for critical thinking (all of which are delivered and nurtured through our programs) prepare students for a multitude of career paths.

Clubs and Internships

The department is home to the Criminal Justice Club in which students may expand their knowledge of criminal justice, the law, and career opportunities through the meetings with professionals and field trips sponsored by these clubs. The department also offers internships and cooperative education opportunities.

School of Education

Department Information

- www.ndsu.edu/education/ (<http://www.ndsu.edu/education/>)

Programs in education at NDSU are administered by the School of Education. Our graduates are prepared to be teachers, counselors, and school administrators and to assume various additional roles in education and throughout the community. Program graduates are capable of working effectively with diverse populations. Through course work and field experiences, students come to an appreciation of - and commitment to - cultural diversity and the elimination of inequitable instructional and institutional practices.

All programs leading to teacher licensure or the school administrator credential with the School of Education are reviewed and accredited at the undergraduate and graduate levels by the Council for the Accreditation of Educator Preparation (CAEP) and are approved by the North Dakota Education Standards and Practices Board (ESPB). Additionally, NDSU is designated by the State Board for Career and Technical Education (NDCTE) as the recognized institution for preparing teachers of Agricultural Education and Family & Consumer Sciences Education. Graduate programs in counseling are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). Program accreditation and program approval assure that graduates of the respective programs may be certified/licensed as teachers, counselors, or school administrators in other states, and also assures that the programs offered through the NDSU School of Education are high quality.

Degrees Offered

- Bachelor of Arts (B.A.) / Bachelor of Science (B.S.) degrees with the following teaching specialties:
 - Agriculture Education; Art Education (offered through NDSU's Visual Arts (<https://www.ndsu.edu/visualarts/>) department); Biological Sciences Education; Chemistry Education; Comprehensive Science Education; Earth Science Education; English Education; Extension Education (minor only); Family & Consumer Sciences Education; French Education; Health Education; History Education; Mathematics Education; Music Education (Instrumental & Vocal; offered through NDSU's Challey School of Music (<https://www.ndsu.edu/performingarts/music/>)); Physical Education; Physics Education; Social Sciences Education; Spanish Education
 - Dual Degree: Elementary Education (offered by VCSU) & Human Development and Family Science (offered through NDSU's HDFS (<https://www.ndsu.edu/hdfs/>) department)
- Masters of Education (M.Ed.) / Masters of Science (M.S.)
 - Agricultural Education (including a Teacher Licensure option);
 - Education (with options in Curriculum & Instruction, English, History, Mathematics, Music, Science, Social Science, Whole Child Approaches, and Teacher Licensure);
 - Educational Leadership (with options in K12 Leadership and Higher Education);
 - Extension Education; and
 - Family & Consumer Sciences Education
- Masters of Science (M.S.)
 - Counseling (with options in Clinical Mental Health Counseling and School Counseling)
- Educational Specialist (Ed.S.)
 - Educational Leadership
- Doctor of Education (Ed.D.) / Doctor of Philosophy (Ph.D.)
 - Education (with options in Adult & Community Education; Institutional Effectiveness; and Organizational Learning & Leadership)
- Doctor of Philosophy (Ph.D.)
 - Counselor Education and Supervision

Admission to Teacher-Licensure Programs

Application forms and instructions for admission to the School of Education are available at the Teacher Education Office, 155 E. Morrow Lebedeff Hall (<https://www.ndsu.edu/alphaindex/buildings/Building::300/>). Students should check the School of Education (<https://www.ndsu.edu/education/>) web site or contact the School of Education office for updates in procedures and requirements.

Students should apply for admission to the School of Education the semester following successful completion of the introductory professional education course, EDUC 321 Introduction to Teaching. Applications deadlines are February 15 and September 15 of each year. A late application may delay completion of the program and graduation requirements. All applications to the school will remain valid for five years from the date of approval or until completion of the baccalaureate degree, whichever comes first. Candidates must earn a grade of 'C' or better in all education (EDUC prefix) courses.

The Teacher Education Council reviews and acts upon completed applications. The Council is the body within the School of Education with jurisdiction over such matters as admission, retention, student teaching, and certification/licensure. The Council informs the students of its action. For questions about admission policies, contact the School of Education (<https://www.ndsu.edu/education/>) office.

Admission Requirements

Undergraduate students may gain admission to the School of Education by meeting the following requirements:

1. Provide evidence of maintaining a minimum grade-point average of 2.75 in the student's total academic program, teaching specialty courses and professional education courses. Transfer students shall complete a minimum of one semester's work and obtain a 2.75 institutional grade-point average at NDSU before their applications are processed.

2. Provide evidence of achieving passing scores on the PRAXIS I test of basic skills or passing scores on the Core Academic Skills test. (The student is responsible for registering for the test and paying the appropriate fee.)
3. Provide a letter of recommendation.
4. Complete 20 hours working with youth within 24 months of application.
5. Submit completed curriculum guide.
6. Provide up-to-date transcripts of all college work (including transfer credits).

Admission of Post-Baccalaureate Students

Students with college degrees seeking teacher certification/licensure should contact the School of Education (<https://www.ndsu.edu/education/>) certification officer for more information. NDSU students who continue in school after graduation or who resume their education within one year following graduation will be considered on the same basis as undergraduates.

Students whose undergraduate academic average was below 2.75 shall increase their overall undergraduate grade-point average to 2.75 or achieve and maintain an average of 3.00 on post-baccalaureate course work while meeting the following conditions:

1. Obtain 24 approved credits in two contiguous semesters, or equivalent.
2. Take each course for a grade other than pass/fail.
3. Obtain approval of all courses from the Teacher Education program.

Post-baccalaureate students must submit an application showing evidence of meeting the requirements listed under "Admission of Undergraduate Students."

Note: These policies refer to admission to Teacher Education for purposes of certification/licensure and are not recommendations for admission to Graduate School.

Student Teaching

Prior to student teaching, student teachers must meet all School of Education requirements including completion and submission of the verification of requirements form (available from the School of Education (<https://www.ndsu.edu/education/>) office). Because student teaching is a full-time experience, students shall not participate in extracurricular activities on campus or participate in employment that detracts from student teaching and shall not be registered for course work other than student teaching EDUC 487 Student Teaching, EDUC 488 Applied Student Teaching and EDUC 485 Student Teaching Seminar. A student teaching course fee will be assessed during the student teaching semester.

Undergraduate Graduation Requirements

Graduation requirements for all students desiring teacher certification/licensure, secondary or K-12, include three basic parts: general education requirements, professional education requirements, and teaching specialty requirements. Upon exiting the program, students:

1. Must complete a capstone portfolio based on the Interstate New Teachers Assessment and Support Consortium (INTASC) standards.
2. Must earn a minimum GPA of 2.75 in each of the following programs:
 - Total academic programs
 - Teaching specialties
 - Professional education courses consisting of a minimum of 27 credits
3. Must pass the PRAXIS II tests (Subject Assessment and Principles of Learning and Teaching (PLT))
4. May complete an application for state certification/licensure and pay the appropriate fee to the state upon completion of the program.

K-12 Certification/Licensure for Physical Education and Music Education Majors

Certification/licensure for kindergarten through 12th grade programs (K-12) is available for students majoring in Physical Education or Music Education. Students must enroll in HDFS 230 Life Span Development or PSYC 250 Developmental Psychology, Elementary Teaching Methods, and student teach at both the elementary and secondary levels, as well as meet the specific requirements for each major department.

Special Notice

Changes in national and state legislation, standards, or rules may result in revised course work requirements. Students should contact the School of Education (<https://www.ndsu.edu/education/>) to keep abreast of possible developments in curriculum areas.

Program Approval and Accreditation

The initial and advanced Teacher Education, advanced Educational Leadership, and advanced School Counseling programs at NDSU are approved/accredited by the North Dakota Education Standards and Practices Board (ESPB), 2718 Gateway Ave., Suite 303, Bismarck, ND, 58503-0585; (701) 328-9641.

The School of Education at NDSU is accredited by the Council for the Accreditation of Educator Preparation (CAEP), 1140 19th St NW, Suite 400, Washington, DC, 20036; (202) 223-0077. This accreditation covers the institution's initial and advanced teacher education, advanced educational leadership, and advanced school counseling programs.

Counseling programs in the School of Education are accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP), 5999 Stevenson Avenue, Alexandria, VA, 22304; (703) 823-9800.

For more information, contact Head, NDSU School of Education (<https://www.ndsu.edu/education/>), Dept. 2625, P.O. Box 6050, Fargo, ND, 58108-6050, 231-7921.

Department of Electrical and Computer Engineering

Department Information

- www.ndsu.edu/ece (<http://www.ndsu.edu/ece/>)

Undergraduate Programs of Study

- Computer Engineering (major)
- Electrical Engineering (major)
- Biomedical Engineering (minor)
- Robotics (minor)
- Electrical Engineering and Physic (double major)

Graduate Programs Offered

- Biomedical Engineering
- Electrical and Computer Engineering

Degrees Offered

- Bachelor of Science in Computer Engineering (B.S.Cpr.E.)
- Bachelor of Science in Electrical Engineering (B.S.E.E.)
- Master of Engineering (M.Engr.)
- Masters of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The mission of the Department of Electrical and Computer Engineering is to provide quality educational opportunities for undergraduate and graduate students through teaching, research, and professional service, and to provide specialized support to the greater community.

Departmental Objectives

1. Prepare our students to become competent electrical and computer engineers.
2. Promote life-long learning practice through continuous curriculum review, research, design, and other scholarly activities.
3. Stimulate student and faculty professional development through publications, participation in professional meetings and societies, and research involvement.
4. Maintain and enhance a positive departmental environment conducive to teamwork, discovery, and professional development.
5. Promote public awareness, interest, and respect for science, engineering, and technology.
6. Provide specialized services to the region, industrial partners, and the professional community.

The intended student outcomes of this major are to provide students with:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Electrical and computer engineers create products and services for society out of materials that exist in nature by using principles of science and creativity. The profession is broad, encompassing products valued by society in many technical specialties from electric power and energy utilization to those for current and future information transmission. Career employment opportunities within the profession range over design, development, manufacturing, sales, management, teaching, and research for industry and government.

Selective Admission

Transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer courses equivalent to ECE 173 (or CSCI 160), ECE 275, EE 206 and all required Math must have a "C" or better before enrolling in ECE courses listed in the curriculums for Junior & Senior years."

An institutional GPA of 2.00 or above is required prior to registration in junior- and senior-level courses. Majors must have a grade of 'C' or better in the following courses:

Code	Title	Credits
All required mathematics courses through MATH 266		
ECE 173	Introduction to Computing	4
EE 206	Circuit Analysis I	4
ECE 275	Digital Design	4

The Programs

Major components of the undergraduate programs are basic science and mathematics, humanities and social sciences, communication, engineering science, engineering design and ethics, and both breadth and depth in electrical and computer engineering. Graduate studies leading to Master of Science and Doctor of Philosophy degrees are offered in the department. For more complete details, see the Graduate Bulletin (p. 733) online.

Highly qualified students may be eligible to participate in an accelerated program which culminates in earning both a baccalaureate degree in either Electrical Engineering or Computer Engineering and a master's degree in Electrical and Computer Engineering. Interested students should contact the department for further details.

Department of Emergency Management and Disaster Science

Department Information

- www.ndsu.edu/emgt (<http://www.ndsu.edu/emgt/>)

Undergraduate Programs of Study

- Emergency Management (major, minor)

Graduate Programs of Study

- Emergency Management

Degrees Offered

- Bachelor of Science Degree (B.S.)
- Master of Science Degree (M.S.)
- Doctor of Philosophy (Ph.D.)

EMERGENCY MANAGEMENT MAJOR

The major is available both live, in person and remote, live. This means you can complete major coursework in our classrooms on campus or from wherever you live at the same time and day as our in person students.

The major prepares students for success as practitioners in emergency management as well as related fields. The rigor of the major also prepares students for graduate work. The major is ideally-suited for students seeking emergency management as a career of first choice. Student career success is built upon the following five program attributes:

1. Provide a broad educational foundation that supports graduates' entry into different settings where emergency management is practiced (e.g., government at all levels; businesses; schools and colleges; healthcare industry; non-profit organizations; humanitarian efforts; etc.);
2. Support evidence-based practice by exposing students to the rich research and science available;

3. Promote and foster experiential opportunities through focused class activities and required internships;
4. Develop skills necessary to the effective practice of emergency management (e.g., communication; collaboration; teamwork; leadership; critical thinking; problem-solving, etc.); and,
5. Support student professional development through faculty mentoring focused on familiarizing students with the roles of and opportunities to pursue training and experience and cultivate professional networks prior to graduation.

Numerous career opportunities are available to those graduating with an emergency management major. Positions are available at all levels of government including city, county, state, and federal. A wide variety of local, national, and international voluntary organizations routinely hire people educated in emergency management, and there is increasing emphasis on hiring individuals educated in emergency management in the private, business sector.

Recent program graduates found employment as a regional emergency planner, homeland security planner, business continuity specialist, hospital emergency manager, emergency manager with the National Guard, public health emergency preparedness coordinator, and disaster insurance adjuster, to name a few examples.

Of note, just as with any degree program in higher education, an emergency management student does not graduate and necessarily go on to be an emergency manager. Graduates consistently find employment in the military, law enforcement, emergency medical services, and fire departments as well. And, many graduates from our degree program go on to work in fields unrelated to emergency management. Our alumni report that the skills and knowledge acquired through our undergraduate degree program in emergency management are highly marketable to other professions and fields.

EMERGENCY MANAGEMENT MINOR

All emergency management minor options are available both live, in person and remote, live. This means you can complete major coursework in our classrooms on campus or from wherever you live at the same time and day as our in person students.

The Department of Emergency Management and Disaster Science offers an emergency management minor with four minor sub-plan options. Each sub-plan option is designed to complement a set of student interests and majors. Options include:

- Vulnerability and Capacity Building
- Risk and Resilience Management
- Homeland Security
- Comprehensive Emergency Management

Department of English

Department Information

- www.ndsu.edu/english (<http://www.ndsu.edu/english/>)

Undergraduate Programs of Study

- English Studies (Major)
- English Education (Major)
- Creative Writing (Minor)
- English - Literary Studies (Minor)
- English - Writing Studies (Minor)

Graduate Programs of Study

- English

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Arts (M.A.)
- Doctor of Philosophy (PhD)

Department Description

The English Department offers students the flexibility to follow interests in community literacies, literatures, linguistics, and creative, technical and professional writing. The curriculum joins the strengths of a traditional humanities education with the civic engagement and career development opportunities today's students seek. Students in English courses develop strong communication skills, multiple research strategies, flexibility in

responding to complex situations, and effective project management skills. Career success is tied to the ability to understand, restate, and analyze complex ideas and texts for multiple audiences. Such success requires habits of investigation, the ability to critically analyze sources of information, and the self-assurance to handle unfamiliar materials and situations. The Department offers multiple opportunities for students to develop these skills both in the classroom and outside the university, as well as working with and for authentic clients.

The flexible degree programs encourage students to pursue curricular and co-curricular experiences in those areas that meet their interests and support their career goals. Literature courses include surveys, multicultural courses, interdisciplinary courses, film courses, and special topic courses. Writing courses offer opportunities to work on technical translation with international partners, to create social media plans for local non-profits, to write grants and proposals for community partners, to develop skills in publishing and editing, and to practice protocols for user experience and usability testing. The department also offers a range of linguistics courses that effectively augment an English degree with social science research experience.

Department of Geosciences

Department Information

- www.ndsu.edu/geosci/ (<http://www.ndsu.edu/geosci/>)

Undergraduate Programs of Study

- Geology (major, minor)
- Geography (minor)
- Environmental Geology (minor)
- Earth Science Education (major)

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)

Department Description

Geology and Geography are the sciences of the Earth; its environments, peoples, and cultures. Understanding the Earth's dynamics, composition, and environment is accomplished through an interdisciplinary curricula including geology, geography, physics, chemistry, mathematics, and soil science.

Opportunities for careers in the geosciences have never been better. Areas of environmental science, petroleum, mining, water and land resources, volcanology, paleontology, and glacial geology offer rewarding careers with a completed bachelor's degree. Many students continue study at the graduate level. Others choose to complement their Geology degree with curricula in Education to teach earth sciences at the K-12 level.

Earth Science Education Major

Teaching Option: Curriculum emphasis is on the teaching of Earth science. Students preparing for teaching Earth science in the secondary schools must follow the School of Education (<https://www.ndsu.edu/education/>) curricula.

Students interested in Earth Science Education (p. 280) are encouraged to declare a double major in their discipline and in education (i.e., Earth Science Education and Geology). Such double majors may typically be earned by successful completion of a few additional credits. Students should contact the Department of Geosciences or the School of Education for details.

Department of Health, Nutrition, and Exercise Sciences

Department Information

- www.ndsu.edu/hnes/ (<http://www.ndsu.edu/hnes/>)

Undergraduate Programs of Study

- Dietetics (major)
- Exercise Science (major)
- Health Education (major)
- Physical Education (major)
- Sport Management (major)

Graduate Programs of Study

- Athletic Training
- Dietetics
- Exercise Science and Nutrition
- Leadership in Physical Education and Sport

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Master of Athletic Training (M.A.Trg.)
- Doctor of Philosophy (Ph.D.)

Department Description

The Department of Health, Nutrition, and Exercise Sciences (HNES) offers students an opportunity to develop skills and knowledge that are vital in attaining personal wellness, and to serve as professionals in careers related to health education, physical education, sport management, exercise science, athletic training and dietetics.

Department of History, Philosophy and Religious Studies

Department Information

- www.ndsu.edu/history (<http://www.ndsu.edu/history/>)

Undergraduate Programs of Study

- History (major, minor)
- Philosophy-Humanities (major, minor)
- Public History (major)
- Religious Studies (minor)

Graduate Programs of Study

- History

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Arts (M.A.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Welcome to the Department of History, Philosophy, and Religious Studies at North Dakota State University. The department is committed to pursuing excellence in scholarship and teaching in all of its many areas of specialization. Our outstanding faculty and students specialize in a wide variety of historical, contemporary, and global themes that reflect the human condition. As a Department in the College of Arts, Humanities, and Social Sciences, the NDSU Department of History, Philosophy, and Religious Studies has over 200 undergraduate majors, and serves thousands of students across the university. The department also has a vibrant community of graduate students who are active in research, fieldwork, and the community. For all of its students, the Department of History, Philosophy, and Religious Studies promotes active learning and individual engagement, provides exciting and diverse learning opportunities, and creates personal and academic connections to last a lifetime.

Department of Human Development and Family Science

Department Information

- www.ndsu.edu/hdfs (<http://www.ndsu.edu/hdfs/>)

Undergraduate Programs of Study

- Human Development and Family Science (major, minor)
 - With options in Child and Adolescent Development, Family Science, and Adult Development and Aging
 - With combined/accelerated 5-year B.S./M.S. programs in each option for qualified students
- Human Development and Family Science & Elementary Education (major)
- Human Development and Family Science & Social Work (major)
 - With options in Family Science and Adult Development and Aging

Graduate Programs of Study

- Family Financial Planning, Financial Counseling, Gerontology, Youth Development, and Youth Program Management and Evaluation (Graduate Certificate)
- Human Development and Family Science (M.S.)
 - With options in Family Financial Planning, Youth Development, and Gerontology
- Developmental Science (Ph.D.)

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Graduate Certificate
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The mission of the Department of Human Development and Family Science (HDFS) is to provide a comprehensive, integrated knowledge of families and individuals across the life span that will equip students for careers in the helping professions and to enter graduate programs. The curriculum emphasizes practical application, acknowledging individuals and families as developing and changing entities within a larger societal context.

Department of Industrial and Manufacturing Engineering

Department Information

- Civil & Industrial Engineering 202, 701-231-9818, www.ndsu.edu/ime (<http://www.ndsu.edu/ime/>)

Undergraduate Programs of Study

- Industrial Engineering and Management (major, minor)
- Manufacturing Engineering (major, minor)
- Reliability Engineering (minor)

Graduate Programs of Study

- Industrial Engineering and Management (MS)
- Manufacturing Engineering (MS)
- Industrial and Manufacturing Engineering (Ph.D.)

Degrees Offered

- Bachelor of Science in Industrial Engineering and Management (B.S.I.E.Mgt.)
- Bachelor of Science in Manufacturing Engineering (B.S. Mfg.E.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The Bachelor of Science degrees in Industrial Engineering and Management and in Manufacturing Engineering are accredited by the Engineering Accreditation Commission of ABET, <http://www.abet.org>.

Career opportunities for graduates of the two programs are often similar in nature which results in similar curriculum requirements. The difference between the two programs is manufacturing engineers ultimately "make things" and their work is tied to the production of goods. Industrial engineers use a systems approach to focus on the "process" of manufacturing goods to provide high quality products at affordable prices. The Industrial

Engineering and Management program covers skill sets and tools that can be used in manufacturing as well as all other industries. Industrial engineers have strong technical skill sets to make improvements in all types of industries including manufacturing settings as well as to evaluate and improve productivity and quality of every aspect of business. Industrial and Manufacturing engineers apply scientific principles to the system design and production of goods and services. They are key team members in design and production of a wide range of products, including automobiles, airplanes, tractors, electronics, toys, building products, foodstuff, and sports and recreational equipment. Both industrial and manufacturing engineers design products and processes to make sure products meet the required reliability, functionality, and quality standards set forth by a company or industry, all while ensuring safety and availability at the best possible price.

In addition, both majors offer the student opportunities for specialization in their junior and senior years. IE&M students can apply their elective courses to extra study in production and operations management, supply-chain and logistics management, reliability and quality engineering, and healthcare engineering and management engineering. MfgE students can elect additional specialization in additive manufacturing, automation, and electronics manufacturing.

Both IE&M and MfgE students learn in an environment of professional realism. Many of the major courses fulfill their learning objectives through projects that are undertaken in collaboration with local companies. Students interact with practicing professionals to learn the real-world applications of the theories they master in the classrooms. In addition, there are five teaching laboratories where students gain hands-on experience and understanding of machining and engineering systems along with three research laboratories providing students with any number of opportunities to learn and develop research skills. Students in both IME majors are urged to take advantage of Cooperative Education and internship positions wherever possible. The knowledge gained through these experiences enhances career preparation and provides for expanded placement opportunity upon graduation.

Learning in the IME Department is a partnership of student and faculty. The student's responsibility is to learn—to master the concepts, theories and practices that lead to career success. The faculty responsibility is four-fold: to provide an atmosphere that is conducive to learning; to assure availability of the tools necessary for effective and efficient learning; to offer guidance on educational and professional matters; and to evaluate student achievement. The usual faculty role is one of mentor, encouraging students to grow in stature as soon-to-be engineers and as practicing professionals.

IME graduates are well prepared for careers in design, development, and implementation of processes and systems that are often conceived in other engineering disciplines. Career positions in IE&M and MfgE form the vital linkages between abstract concepts and the reality of products and facilities of real use to customers. IME graduates are in demand for employment in a wide range of industries from the production of all types of goods, to transportation and distribution, information management, healthcare, and consulting just to name a few. The possibilities are endless.

In all cases, career positions for IME graduates involve design of processes and procedures in advanced technology environments. These professions routinely apply sophisticated modern tools in information handling, distributed communications, computer-driven controls, and a wide variety of technologically advanced equipment and apparatus. In addition, IME career professionals are skilled in the integration of people and technology within the business context of world-class enterprises. They have meaningful careers in organizations of all types and sizes, located in all parts of the world.

Department of Management and Marketing

Department Information

- www.ndsu.edu/business (<http://www.ndsu.edu/business/>)

Undergraduate Programs of Study

- Business Administration (major, minor, with online option)
- Global Business (second major only)
- Entrepreneurship (certificate, minor)
- Management (major)
- Marketing (major)
- Logistics Management (minor)
- Professional Selling (certificate)

Graduate Programs of Study

- Business Administration

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Business Administration in Business Administration (M.B.A.)
- Master of Business Administration in Agribusiness (M.B.A.)
- Graduate Certificate in Business Analytics

- Graduate Certificate in Digital Marketing and Innovation
- Graduate Certificate in Investments and Applied Portfolio Management
- Graduate Certificate in Leadership and Managerial Skills

Department Description

The Department of Management and Marketing offers majors in Business Administration, Management and Marketing. Students graduating with any of these majors find employment in a broad range of industries, as well as government and non-profit organizations.

Practicum/Internships

Students majoring in Business Administration, Management, or Marketing are encouraged to complete a practicum (internship) experience while enrolled in the professional program. The practicum (internship) prepares students for challenges of the business world through practical experience in their primary area of study. Students must consult with their faculty advisor and obtain approval prior to enrolling in the practicum. Credits will be applied as free electives in the major and do not satisfy any of the professional requirements listed on the curriculum guide.

Department of Mathematics

Department Information

- www.ndsu.edu/math (<http://www.ndsu.edu/math/>)

Undergraduate Programs of Study

- Mathematics (major, minor)
- Mathematics and Computer Science (double major)
- Mathematics and Physics (double major)
- Mathematics and Statistics (double major)

Graduate Programs of Study

- Mathematics

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Mathematics is the language of science and technology. Its explosive development in the 20th century and its history as the oldest and most highly developed discipline make it one of the most exciting and rewarding areas of study.

The use of mathematics and the need for mathematical competence has increased tremendously. Mathematical training is in high demand in such fields as actuarial science, business, economics and commerce, engineering, and statistics, as well as the basic sciences. These disciplines, in turn, provide new directions to the mathematical community. Trends indicate that students should plan their programs to reflect the increased emphasis on interdisciplinary competency.

Students are able to study theoretical and applied mathematics to prepare for careers or for further schooling while studying with faculty members who have a wide range of interests and expertise. Students may earn academic credit by applying what they have learned in the classroom as they gain on-the-job experience through the Cooperative Education program. Opportunities also exist for students to work as paper graders and assistants to professors.

The department offers a broad and balanced curriculum of courses. A student may major or minor in Mathematics or Mathematics Education.

Students interested in Mathematics Education should consult with their major adviser and the School of Education (<https://www.ndsu.edu/education/>) for professional education requirements. Students interested in Mathematics Education are encouraged to declare a double major in their discipline and in education (i.e., Mathematics Education and Mathematics).

Double Majors

Special double majors are available with Computer Science, Physics, and Statistics. These double majors take advantage of the close relationship between mathematics and other disciplines, and allow students pursuing a major in one of these fields to expand their mathematical background.

While the choice of major need not be made during the freshman year, an early decision allows more flexibility in tailoring programs to individual interests. The department also has a graduate program offering both an M.S. and a Ph.D. in Mathematics.

Department of Mechanical Engineering

Department Information

- www.ndsu.edu/me (<http://www.ndsu.edu/me/>)

Undergraduate Programs of Study

- Mechanical Engineering (major)

Graduate Programs of Study

- Mechanical Engineering

Degrees Offered

- Bachelor of Science in Mechanical Engineering (B.S.M.E.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Mechanical engineering is a broad field primarily concerned with the principles of motion, energy, and force. Mechanical engineers are called upon to design machinery, mechanisms, devices, and systems that function safely, reliably, and efficiently to serve the needs of society. To accomplish this, mechanical engineers apply scientific principles to problems that involve the motion of heat, gases, fluids, and solid materials.

Mechanical engineers may be found in nearly all segments of society. They work in industry, consulting practices, government facilities, and universities. In industry, mechanical engineers work for equipment manufacturers, utilities, material processing plants, environmental firms, and companies involved in automotive, aerospace, transportation, petroleum, biomedical, automation, and others. Mechanical engineers employed by the government and universities contribute to the betterment of society by conducting research to solve present and future problems. As technology becomes more prevalent in daily life, mechanical engineers are increasingly called upon to apply that technology to develop products that improve the standard of living.

Aviation Program

A program of flight training is available, which prepares students for the FAA examinations for the Private Pilot's License. Three courses are offered under this program:

Code	Title	Credits
ME 311	Introduction To Aviation	3
ME 312	Introduction to Flight	2
ME 313	Commercial Instrument Ground School	3

Any student enrolled at NDSU or one of the other two Tri-College (p. 26) institutions may enroll in this program. No other courses are required as prerequisites.

Cooperative Education

Students in Mechanical Engineering may participate in the Cooperative Education program (<https://career.ndsu.edu/>) at NDSU starting in their sophomore year. Students gain valuable industrial experience to complement their academic studies. Internships may last from one to three semesters.

Wages and benefits for Cooperative Education students are determined by the employer and are influenced by such factors as established wage scales, the co-op student's responsibilities, and the nature of the employer's business.

Department of Microbiological Sciences

Department Information

- www.ndsu.edu/micro (<http://www.ndsu.edu/micro/>)

Undergraduate Programs of Study

- Biotechnology (major, minor)
- Microbiology (major, minor)
- Microbiology and Masters of Public Health (3+2 option)

Degrees Offered

- Bachelor of Science (B.S.)

Department Description

We explore novel research in agriculture and health and share with students our fascination and knowledge of microbiology. We work to achieve excellence by creating a student-centered environment that values diversity and encourages discovery, ingenuity, integrity, and collegiality. Students interested in per-veterinary medicine should talk with an academic advisor about their options.

Department of Military Science - Army ROTC

Department Information

- www.ndsu.edu/armyrotc (<http://www.ndsu.edu/armyrotc/>)

Undergraduate Programs of Study

- Military Science (minor)

Department Description

The Army Reserve Officers' Training Corps (Army ROTC) program is conducted by the Department of Military Science. Army ROTC gives students the opportunity to become involved in a unique program that adds the leadership dimension to their college education. It also provides several financial assistance options. Students, regardless of their majors, are eligible to participate in this program. The primary objective of the program is to provide the knowledge and skills required for men and women to serve as commissioned officers in the active Army, Army Reserve, or Army National Guard. NDSU's Military Science Department is seeking students who have leadership potential, particularly those who are scholars, athletes, and leaders.

The Army ROTC program is a multi-year program of instruction in the military sciences taken in conjunction with an academic program curriculum. Advanced placement credit may be received for previous or current military service. The program requires a minimum of 19 credit hours and leads to a minor in Military Science. The program is divided into two parts: the basic course and the advanced course.

The basic course is normally taken during the freshman and sophomore years. Students participating in the basic course incur no military obligation or commitment. Instruction offered in the basic course includes: physical fitness class, military leadership and management, land navigation, U.S. military history, first aid, tactics, and drill and ceremonies. Military skills laboratories also are offered. These include adventure activities such as rappelling, rope bridging, tactics, military equipment use, drill and ceremony, survival techniques, and a leadership reaction course.

Students entering the advanced course must have a minimum of two years of academic work remaining in a curriculum leading to either a baccalaureate or graduate degree. Students may qualify for entry into the advanced course by one of the following: completing the basic course, completing basic training, attending the 30-day Basic Camp, or having prior military service in any of the armed forces of the United States. Members of the Army National Guard or Army Reserve may qualify for direct entry into the advanced course and can maintain membership in their Guard/ Reserve Unit by enrolling in the Simultaneous Membership Program (SMP) option.

Advanced course students receive instruction in advanced leadership and management and are afforded the opportunity to apply their acquired knowledge to practical situations. Military skills laboratories also are offered. In addition to the listed military science curriculum, advanced course students must complete an approved course in written communication skills, military history, and computer literacy.

Most basic students attend a 30-day Basic Camp between the first and second year of the basic course. Advanced Cadets attend a 30-day Advanced Camp between the first and second year of the advanced course. Both of these courses are held at Ft. Knox, Kentucky (near Louisville). The Advanced Camp is designed to develop and evaluate a student's judgment and decision-making abilities, build physical endurance and self-confidence, and allow a student to apply leadership skills. Leadership positions are rotated among the students so that each person experiences firsthand what it takes to apply leadership skills and develop an organization. Students are also able to apply for internships and trips abroad.

Two to Five-year Army ROTC scholarships are available, which provide for payment of tuition and fees or \$10,000 room and board stipend. Students receive \$600 per semester for books and equipment, and an allowance of \$350 to \$500 per month for each year the scholarship is in effect. Generally, four-year scholarships are awarded to high school students who wish to compete during their senior year for a scholarship, but college freshmen also have been awarded this highly desirable scholarship for Active, Guard, and Reserves.

Students who do not qualify for the ROTC program or who do not wish to pursue an officer's commission may audit courses in the advanced ROTC program and if they have enough credits can receive a Military Science Minor, if approved by the professor of military science. Auditing student's participation is limited to the classroom and they are not eligible for monetary allowances.

For detailed information on the Army ROTC program, contact the Department of Military Science, 1-800-798-7575 or 231-7575, Room 103 Bentson/Bunker Fieldhouse (<https://www.ndsu.edu/alphaindex/buildings/Building::351/>) or visit the department web site at www.ndsuarmyrotc.com (<http://www.ndsuarmyrotc.com/>).

Department of Modern Languages

Department Information

- www.ndsu.edu/modernlanguages/ (<http://www.ndsu.edu/modernlanguages/>)

Undergraduate Programs of Study

- French (major, minor)
- French Studies (minor)
- German (minor)
- German Studies (minor)
- Spanish (major, minor)
- Spanish Studies (minor)

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)

Department Description

Today's interconnected world generates the need to be able to communicate in more than one language. As networks of international cooperation and exchange grow in complexity, particularly among governments and businesses, those who possess foreign language competence become increasingly valuable. Moreover, it has been shown that learning a second language can improve one's overall writing and speaking ability.

The Department of Modern Languages offers major programs in French and Spanish, and courses in German. Study Abroad and the experience of living in another culture are an integral part of majoring in languages at North Dakota State University. Through the Tri-College University consortium (p. 26), NDSU students may also study Chinese, Japanese, American Sign Languages, and classics.

In addition, degree programs in French Education and Spanish Education are offered between the Department of Modern Languages and the School of Education (<https://www.ndsu.edu/education/>).

Language Placement

Students must adhere to the placement requirements when enrolling in a language course for the first time at NDSU. If, after appropriate placement, the student's instructor recommends that because of exceptional circumstances the student should be placed at a lower level, full credit at the new level may be granted.

Credit for Advanced Language Placement

A student placed at an advanced level may receive NDSU credit for those courses waived, upon fulfillment of the following conditions:

1. The student has completed no previous college-level credit in that language;
2. The student enrolls consecutively in at least two courses within the same level, i.e., 201-202, (intermediate); 311-312, (advanced); and receives grades of 'B' or better, (courses may not be taken pass/fail);
3. The student submits a petition form obtained from the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>), signed by the instructor and the department chair.

Major and Minor Programs

Language majors and minors may be obtained in French and Spanish, and a minor is offered in German. German courses are available through the third-year level.

Both the French and Spanish majors consist of a minimum of 28 credits above the intermediate level. At least nine of these credits must be in advanced language; the remainder may be chosen from a variety of courses in linguistics, literature, and culture. A minimum of one year of a second foreign language at NDSU, or the equivalent, is required. French and Spanish majors must earn a minimum grade of a 'B' for courses in the major,

including credits received for study abroad. Junior and senior year course work will be determined in consultation with a faculty adviser according to the student's background and interests.

A minor necessitates completion of a minimum of 18 credits beyond the intermediate level. At least nine of these credits must be in advanced language (normally conversation/composition).

Career Directions

Experience has shown that many students, with or without declared modern language majors or minors, find a second language background especially useful when combined with preparation in another professional field. Examples include health care, public relations, journalism, TV and radio broadcasting, hotel management, publishing and editing, government service, banking, and management.

One of the more promising occupational fields for language students has been international business. Individuals with foreign language skills are finding increased opportunities with multinational corporations, especially in management and marketing. Many companies with international ties recruit candidates possessing linguistic training because they recognize its correlation with effective verbal and written communication. Regardless of their specific majors, students are encouraged to contact the department for information and advice on career application of foreign language skills.

Students wishing to prepare for high school teaching should make this intention known to the School of Education (<https://www.ndsu.edu/education/>) and to the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages/>) to make certain that the requirements for state certification are met. Competitiveness and flexibility in the job market tend to be greater if certification can be obtained in two or more different areas.

Challey School of Music

Department Information

- www.ndsu.edu/performingarts/ (<http://www.ndsu.edu/performingarts/>)

Undergraduate Programs of Study

- Music (major, minor)
- Music Performance - Instrumental, Piano, Vocal (major)
- Music Education - Instrumental, Vocal (major)

Graduate Programs of Study

- Music Performance (Vocal, Instrumental, Piano, Collaborative Piano)
- Music Conducting (Choral, Instrumental)
- Music Theory Pedagogy
- Music Education

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Bachelor of Music (B.Mus.)
- Master of Music (M.M.)
- Doctor of Musical Arts (D.M.A.)

Department Description

NDSU Challey School of Music prepares students for careers in teaching, performance, and related liberal studies. It also provides creative opportunities for all talented student musicians regardless of major, and seeks to foster an appreciation of music throughout the greater NDSU community.

NDSU is accredited by the National Association of Schools of Music. Programs of study lead to the Bachelor of Music with options in Performance and Music Education; the Bachelor of Arts or Bachelor of Science in Music; the Master of Music with options in Performance, Conducting, Theory Pedagogy, and Music Education; and the Doctor of Musical Arts with options in Performance and Conducting.

Majors/Minors

Admission to music major or minor programs is arranged through an audition and interview; for information, please contact the Division of Performing Arts (<https://www.ndsu.edu/performingarts/>) office. All undergraduate music majors take private lessons, participate in ensembles, and take a broad range of courses appropriate to their areas of emphasis. All music courses must be passed with a grade of 'C' or better. A performance achievement jury must be passed prior to registration in 300-level applied study.

The Bachelor of Music degree in Performance is for talented vocalists and instrumentalists who wish a career as a professional performer or conductor, and who will likely continue their studies in graduate school. The Bachelor of Music degree with certification in Music Education is for students who wish to teach K-12 music in North Dakota's public schools. Certification requirements for other states varies, but North Dakota licensure is congruent with that of many other states. Experiences in a broad spectrum of music education courses—elementary, instrumental, and voice/choral—results in NDSU's outstanding reputation for producing teachers with excellent and versatile credentials.

Music majors pursuing a Bachelor of Arts or Bachelor of Science degree (without public school teaching certification) are generally interested in a broad liberal arts education with a significant number of electives.

Music majors and minors supplement their course work by attending recitals and concerts. Those in applied study perform for the jury examination at the end of each semester. Students enrolled in private applied study also participate in a related major ensemble; pianists sometimes play with chamber ensembles or accompany large ensembles.

Ensembles

The NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, University Symphony Orchestra, Madrigal Singers, two large Jazz Ensembles, Jazz Combos, the Gold Star Marching Band, Brass Ensemble, University Chamber Singers, NDSU Statesmen (Tenor/Bass choir), Cantemus (Soprano/Alto choir), University Band, Bison Pep Bands, NDSU Opera Theatre, and chamber ensembles in typical instrumental and vocal combinations. The Concert Choir, Wind Symphony, Jazz Ensemble, Madrigal Singers and several other groups have touring programs, some of which are national or international in scope. Participation in these ensembles is open to all students, some by audition and some as open-enrollment ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 28) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

School of Natural Resource Sciences

Department Information

- www.ndsu.edu/snrs (<http://www.ndsu.edu/snrs/>)

Undergraduate Programs of Study

- Natural Resources Management (major, minor)
- Range Science (minor)
- Soil Science (minor)

Graduate Programs of Study

- Entomology
- Natural Resources Management
- Range Science
- Soil Science

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Natural Resources Management (M.N.R.M.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Natural resources form the foundation of agronomic productivity and ecological health. Increasing global demands for fresh water, sustainable food supplies, energy, and a healthy environment requires preparation of graduates to study and manage these complex issues. The School of Natural Resource Sciences offers degrees in Natural Resource Management, which include six emphasis areas: Entomology; Environmental Sustainability; Outreach and Policy; Rangeland Ecology; Rangeland Livestock Production; Soil Science; and Water, Habitat, and Environmental Management. Faculty in the School are nationally recognized and careers range from local agronomists to global resource policy makers.

School of Nursing

Department Information

- www.ndsu.edu/nursing (<http://www.ndsu.edu/nursing/>)

Undergraduate Programs of Study

- Nursing (major)

Graduate Programs of Study

- Nursing

Degrees Offered

- Bachelor of Science in Nursing (B.S.N.)
- Doctor of Nursing Practice (D.N.P.)

Department Description

The NDSU Bachelor of Science in Nursing (BSN) is offered at two locations: NDSU Fargo and NDSU Nursing at Sanford Health in Bismarck. On the NDSU Fargo campus, department and faculty offices are located in the Stop and Go Center (<https://www.ndsu.edu/alphaindex/buildings/Building::322/>) (SGC). On the Bismarck site, department offices, faculty offices, laboratories, and classrooms are located in a building north of Sanford Health.

The BSN Nursing program offers three tracks. The Pre-Licensure BSN track is a four-year course of study. The LPN to BSN track is a two year course of study designed for Licensed Practical Nurses (LPN) to obtain a BSN degree. Upon successful completion of the Pre-Licensure BSN and LPN to BSN programs, graduates are eligible to apply for licensure as a registered nurse (RN). The RN to BSN track is a part-time, five semester course of study designed for Registered Nurses (RN) to obtain a BSN degree. The NDSU Nursing program is approved by the North Dakota Board of Nursing and is nationally accredited by the Commission on Collegiate Nursing Education (CCNE).

Vision

The School of Nursing is a national leader, positively impacting the health of society through excellence in nursing education, research, practice, and service.

Mission

The mission of the School of Nursing is to advance nursing knowledge and develop dynamic nurse leaders who improve the health of all people, including underserved, rural, and diverse populations.

Core Values

Through commitment to the following **Core Values**, we promote excellence in nursing education, research, practice, and service:

- **Professionalism** – We are committed to professionalism as foundational to nursing practice. Professional nursing encompasses integrity, respect, collegiality, autonomy, inter-professional collaboration, and ethical practice.
- **Caring** – We are committed to caring for the needs of all people with sensitivity and compassion in a holistic manner. Caring is central to nursing practice.
- **Service** – We are committed to the people of North Dakota by providing high quality nursing programs to promote the health of the state's citizens. We provide nursing expertise and service at the University, state, regional, national, and international levels.
- **Scholarship** – We are committed to discovering and disseminating new knowledge and using nursing scholarship to practice evidence-based care. As a practice profession and an academic discipline, nursing is an art and science.
- **Quality** - We are committed to improving healthcare quality and patient safety through our excellence in education, research, and practice.
- **Social Justice** – We are committed to promoting equity and fairness, reducing health disparities, and honoring the dignity and diversity of students, faculty, staff, and the people we serve.
- **Learning** – We are committed to facilitating reflective, active, and life-long learning by providing engaging, dynamic, and innovative educational environments and experiences.

The **School of Nursing** fosters the achievement of outcomes necessary to develop dynamic nurse leaders who improve the health of all people. Undergraduate outcome categories are critical thinking, communication, professional values, clinical competence, and leadership.

Curriculum

The curriculum is organized according to a conceptual model that flows from the mission and values of the nursing program. The "Essentials of Baccalaureate Education" (American Association of Colleges of Nursing, 2009) and "The Standards of Nursing Practice" (American Nurses Association, 2010) served as guidelines for development of the curriculum. The content of the program increases in scope and complexity as the student progresses through the major.

BSN Graduate Outcomes

The BSN graduate of the North Dakota State University baccalaureate nursing program will:

1. Utilize the nursing process to provide nursing care for healthy, unhealthy, or potentially unhealthy human responses of individuals, families, groups or communities.
2. Evaluate and utilize research findings, theories, and clinical practice guidelines in the performance of evidence-based practice.
3. Synthesize theoretical and empirical knowledge from the nursing, behavioral, social and natural sciences, and the arts and humanities to provide professional nursing care at an entry level of practice.
4. Employ critical thinking for decision-making in clinical practice.
5. Collaborate with the healthcare team as well as individuals, families, groups, and communities to provide patient centered care that promotes wellness, accelerates healing, and prevents disease in all stages of life.
6. Model effective, interactive communication on the interprofessional team.
7. Use information and healthcare technologies to plan and provide patient centered care.
8. Demonstrates responsibility and accountability for ongoing professional development.
9. Provide culturally competent and sensitive patient care.
10. Advocate for patients rights through incorporation of professional values, ethical principles, and legal principles.
11. Manage nursing activities, utilize leadership skills in the delivery of comprehensive, evidence-based, patient centered care with respect for humanity and uniqueness of others.
12. Participate in the quality improvement of care to enhance safe, quality, and cost effective healthcare.
13. Demonstrate knowledge of nurse's role in shaping healthcare policy.

School of Pharmacy

Department Information

- www.ndsu.edu/pharmacy (<http://www.ndsu.edu/pharmacy/>)

Undergraduate Programs of Study

- Non-Degree Pre Pharmacy
 - Courses needed to apply to Pharm.D. program

Professional Programs of Study

- Pharmacy

Graduate Programs of Study

- Pharmaceutical Science

Degrees Offered

- Doctor of Pharmacy (Pharm.D.)
- Doctor of Philosophy (Ph.D.)

School of Pharmacy

The NDSU School of Pharmacy housed in the College of Health Professions offers pathways of opportunity in pharmacy for you to pursue careers that can lead to an array of options for success.

As a pharmacist, you work with patients and other health care providers to promote health and prevent diseases. Pharmacists assess, monitor, initiate and modify patients' medication therapy to achieve optimal therapeutic outcomes.

Programs help you chart your future career

The professional pharmacy (PharmD) program is provided through a combined effort between the Department of Pharmacy Practice and the Department of Pharmaceutical Sciences.

Pharmacy Practice focuses on the clinical application of pharmacy and patient-focused care. Pharmaceutical Sciences focuses on providing you with a basic science foundation for learning.

Mission

The School of Pharmacy educates the next generation of highly competent, caring, and ethical pharmacists and scientists through a high quality contemporary curriculum emphasizing innovative interprofessional education and research/scholarship which serves the needs of North Dakota, region, nation, and world.

We will accomplish this by:

- Fostering a culture that values competency, caring, ethics, inclusivity, and professionalism.
- Delivering an effective curriculum that prepares students to work in diverse settings and interprofessional teams.
- Collaborating with key partners and stakeholders to enhance teaching, research/scholarship, practice, professional experience, and service opportunities.
- Utilizing interprofessional approaches in teaching, research/scholarship, clinical practice and service efforts.
- Providing professional and interprofessional development opportunities for faculty, staff, students, alumni, pharmacists, and preceptors.
- Securing sufficient financial, physical, and human resources to engage in effective teaching, research, practice, and service.
- Continually improving the quality of education, and research/scholarship.
- Developing pharmacists and scientists to meet the health care needs of the state, region, nation, and world.

Vision

The School of Pharmacy will be a nationally recognized leader in pharmacy education, research, and outreach which is known for its high quality and impact on improving human health.

Indicators that we are moving toward our Vision:

- Students and graduates are sought after as caring, competent, and ethical health professionals and researchers.
- Graduates have a high level of achievement as measured by licensure and certification exams and job placement.
- Faculty are recognized for best practices in teaching, curriculum improvement, and as leaders by discipline-related organizations.
- The School is nationally recognized for innovations in rural healthcare.
- Faculty and graduates discover and disseminate new knowledge as demonstrated by competitively funded research, high quality scholarly publications, and innovative product and practice development.
- Alumni are recognized for their consistent high level of achievement, leadership and involvement in professional organizations, and sustained contributions to their profession.
- Faculty have the resources of staff, time, space, and money to accomplish excellence in teaching, research, practice and service.
- Our impact will be local, national and global.

Pharmacy Practice

The Department of Pharmacy Practice strives to provide students with the knowledge, skills, abilities, and attitudes necessary to become capable pharmacy practitioners able to deliver high-quality patient-centered care upon entering the profession regardless of the practice environment. The Department provides teaching, service, and research/scholarship that promote population and vital communities in North Dakota and advance postgraduate education through affiliated pharmacy residency programs. Pharmacy Practice faculty provide patient-centered care for patients and precept pharmacy students in a variety of pharmacy settings. The Department provides educational support for pharmacy students, licensed pharmacy professionals, and pharmacy technicians. The Department also coordinates scholarly and service activities to promote better health care in North Dakota, help address gaps in health care, and meet evolving health-related needs through development of skills, knowledge, research, and innovation in pharmacy-related practices and services.

Vision

The vision of the Department of Pharmacy Practice is to be a national leader in pharmacy education and care through a high-quality outcome-driven pharmacy curriculum, effective and novel instructional strategies, innovative practice models, high quality research/scholarly activities, as well as state and national services that efficiently, effectively, ethically, and continuously meet the changing needs of populations in the United States.

Mission

The mission of the Department of Pharmacy Practice is to educate students and practitioners, advance research/scholarship, deliver quality evidence-based patient-centered care, and provide service to the profession.

We will accomplish this by:

- Developing students and graduates who are recognized as competent health care professionals.
- Providing a relevant, practical, integrated, and outcome-driven curriculum.
- Promoting interprofessional health care within the state.
- Providing quality and diversified introductory and advanced pharmacy practice experiences.

- Securing financial, physical, and human resources to engage in effective teaching, research/scholarship, practice, and service.
- Providing an organizational environment that fosters recruitment, retention, engagement, and promotion of faculty and staff.
- Promoting collaboration within the Department as well as among the College, University and external organizations.
- Providing community-based outreach to promote healthy populations and vital communities in North Dakota.
- Providing training to support the development of practitioners that reflects the changing landscape of health care and pharmacy profession
- Supporting the role of the pharmacist in rural and public health.
- Supporting post-graduate pharmacy education including pharmacy residency programs and the dual degree Doctor of Pharmacy (Pharm.D.) and Master of Public Health (MPH) program.

Pharmaceutical Sciences

Our outstanding pharmaceutical sciences department faculty members are committed to delivery of excellent pharmaceutical science education and training and actively participate in interdisciplinary research enterprise. The Department's mission is to support, educate, and train undergraduate, professional, and graduate students to become highly skilled and caring healthcare professionals and create new knowledge through excellence in pharmaceutical research.

Vision

The Department of Pharmaceutical Sciences will be a recognized leader in pharmaceutical sciences by achieving excellence in research, teaching and service through innovation, collaboration and professionalism.

Indicators that we are moving toward our Vision:

- Ranking among the top 20 Pharmaceutical Sciences research and graduate programs in the U.S. based on the number and quality of graduate students and faculty, extramural funding, publications and infrastructure.
- Number and quality of publications in peer-reviewed journals.
- Research, teaching and service awards.
- The number of new collaborative projects advancing our mission.
- Business alliances with biopharmaceutical industries.

Mission

The mission of the Department of Pharmaceutical Sciences is to educate and train future pharmacists and scientists and to advance pharmaceutical research that improves human health.

We will accomplish this by:

- Improving the quality of teaching and mentoring professional and graduate students.
- Conducting high-quality research in prevention, diagnosis and treatment of diseases and disseminating the results in leading scientific journals and conferences.
- Providing professional service to the College, University, and the scientific community.
- Establishing internal and external partnerships, collaborations and strategic alliances to advance our mission.

Department of Physics

Department Information

- www.ndsu.edu/physics (<http://www.ndsu.edu/physics/>)

Undergraduate Programs of Study

- Physics (major, minor)
- Physics and Computer Science (dual major)
- Physics and Mathematics (dual major)
- Physics and Electrical Engineering (dual major)
- Mechanical Engineering and Physics (dual major)

Graduate Programs of Study

- Physics

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Physics is the most fundamental and exact of the physical sciences. Its laws are basic to deep understanding in all of technology, and in many fields of study, such as astronomy, chemistry, materials science, engineering, photonics, biology, medicine, geology, and environmental science.

The Department of Physics offers an undergraduate major in Physics, along with an option in Optical Science and Engineering. For students interested in teaching in secondary schools, a major in Physics Education is offered in conjunction with the School of Education (<https://www.ndsu.edu/education/>). Special double major programs in Mathematics and Physics, Computer Science and Physics, Electrical Engineering and Physics, and in Mechanical Engineering and Physics are also available. These programs allow well-prepared students to complete the requirements for both majors in four years by taking advantage of the close connections between physics, mathematics, and computer science.

The Department also offers an undergraduate minor in Physics, as well as M.S. and Ph.D. degrees in Physics at the graduate level. Highly motivated undergraduate students may elect to pursue an accelerated master's degree starting in their junior year, resulting in both a bachelor's degree and a master's degree in Physics after approximately five years of study; interested students should contact their adviser for details.

Mission Statement

To engage students, campus and community in the most fundamental of all sciences through excellence in teaching, first-class research, and dedicated outreach.

Department of Plant Pathology

Department Information

- www.ag.ndsu.edu/plantpath/ (<http://www.ag.ndsu.edu/plantpath/>)

The Department of Plant Pathology offers graduate study leading to the M.S. and Ph.D. degrees. Advanced degrees may involve specialized training in the following areas: host-parasite genetics, molecular biology and genomics, epidemiology, tissue culture, soil and seed-borne diseases, microbial ecology, and integrated disease management.

Student research and academic programs are tailored to individual needs and interests.

Five graduate faculty members are housed in the Northern Crops Science Laboratory located on campus. This relationship provides additional opportunities for research and consultation.

Department of Plant Sciences

Department Information

- www.ag.ndsu.edu/plantsciences (<http://www.ag.ndsu.edu/plantsciences/>)

Undergraduate Programs of Study

- Crop and Weed Science (major, minor)
- Food Science (major)
- Horticulture (major, minor)

Graduate Programs of Study

- Cereal Science
- Horticulture
- Plant Sciences

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

The plant-based agriculture and food industries are an integral part of our everyday lives. The crop sciences will be essential in ensuring a plentiful and safe food supply and will require graduates that can provide leadership in high quality crop production and sustainable farming practices around the world. Horticulture involves intensive cropping technology, including the development, production, distribution and utilization of vegetables, fruits, turfgrass, woody landscape and greenhouse plants. Food scientists use basic sciences and engineering to convert crops into everyday food products found in the marketplace.

The NDSU Department of Plant Sciences provides students with the knowledge, skills and understanding critical for professional success in a changing world. Our curriculum includes majors in Crop and Weed Sciences, Food Science, and Horticulture. Within these majors multiple curriculum options are available to refine a student's career path.

Department of Political Science & Public Policy

Department Information

- ndsu.poli.sci@ndsu.edu

Undergraduate Programs of Study

- Political Science (major, minor)
- Pre-Law (minor)

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)

Department Description

Our department serves approximately 100 undergraduate students. The department offers bachelor's degrees and minors in political science and a minor in pre-law. Political science students also have the option to pursue an emphasis in pre-law or public service.

About the Faculty

Our eight faculty members in the department represent a wide array of expertise, including international relations, American government, public policy, constitutional law, the politics of gender, comparative politics, and more. Across the board, the department faculty are prolific scholars and have involved students in their research.

Career Paths for our Students

Political science majors gain analytical skills, administrative competence, and communication abilities that are valued in a wide spectrum of potential careers in federal, state, and local governments; law; business; international organizations; non-profit organizations; campaign management and polling; journalism; pre-collegiate education; electoral politics; research; and college and university teaching.

In a recent list from Bankrate.com, political science was ranked in the top third of degrees in terms of making a living after graduation. This was top amongst AHSS college majors.

Moreover, NDSU Political Science offers annual **study abroad** experiences. Recent programs have taken students to the United Kingdom, the Netherlands, Belgium, and Italy. Political Science **internships** provide hands-on experience in government, political parties and campaigns, legal offices, or private organizations engaged in politics or public policy. The Upper Midwest Public Policy Institute offers students opportunities to **conduct research** about politics and public policy.

In sum, the content knowledge, the analytical and communication skills, and the capacity for critical thinking (all of which are delivered and nurtured through our programs) prepare students for a multitude of career paths.

Clubs and Internships

The department is home to the three student organizations:

- **Political Science Club** – Organizes debates, speaking events, and other events to better engage the campus community with politics and current events
- **Pre-Law Club** - Designed to provide students with information about law schools, entrance examinations, and career opportunities in the field of law
- **Pi Sigma Alpha** – National Political Science honor society

Department of Psychology

Department Information

- www.ndsu.edu/psychology (<http://www.ndsu.edu/psychology/>)

Undergraduate Programs of Study

- Psychology (major, minor)
- Neuroscience (minor)

Graduate Programs of Study

- Psychology

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Doctor of Philosophy (Ph.D.)

Department Description

Psychologists study the brain, the mind, behavior, and their inter-relationships, relying heavily upon the methods of science. Some areas of psychology are most closely related to the natural and biological sciences while other areas within psychology are more closely related to the social sciences, especially sociology, anthropology, and communication. Both an undergraduate major and an undergraduate minor in psychology are available. Psychology majors may select the degree program that best suits their needs and interests from the B.A. and B.S. tracks outlined in this section.

All majors must complete 30 credits in psychology as listed in the outline for the degree. Additional courses in psychology may be selected, in consultation with the adviser, from any of those listed under the department's offerings. Courses in the major field may not be taken on a pass/fail basis (except PSYC 494 Individual Study and PSYC 496 Field Experience, which may be graded on a pass/fail basis by the instructor).

The B.S. psychology major also requires a supporting track in one of the following areas:

1. **Natural Science Track:** 14 additional credits in math, computer science, statistics, and/or science
2. **Social Science Track:** 14 additional credits in social science (other than psychology)
3. A **Minor** in an approved area of study

Career Orientation Overlays

An undergraduate education in psychology leads to a number of career choices following graduation. To assist students in preparing for post-graduate work and careers in psychology or related fields, the department has prepared several Career Orientation OverLays (COOLs).

COOLs establish curriculum guidelines and suggestions for students who may be interested in a variety of careers, including medicine and neurosciences, business and industry, graduate school in psychology, or mental health and applied psychology. COOLs, when used in conjunction with the counsel of an adviser, are intended to help a student select the best courses within and outside of psychology (e.g., biology for medicine or business for industrial psychology) to suit particular interests and career goals.

Advising

Freshman and transfer students receive introductory academic advising from the department's professional advisor in conjunction with NDSU's Career and Advising Center. This preparatory advising continues until students are assigned to a faculty advisor to start their junior year. In addition to these professional and faculty advisors, students can use our web-based advising center to obtain information about the psychology curriculum and career planning. Printed handouts with this information are also available from the department.

Department of Public Health

Department Information

- www.ndsu.edu/publichealth/ (<http://www.ndsu.edu/publichealth/>)

The Department of Public health is part of a culture of academic excellence, made evident by the university's position as a top research university as reported by the Carnegie Commission on Higher Education. The MPH program fosters this commitment by keeping class sizes small and providing opportunities for students to work closely with faculty on research projects.

Public health is defined as the practice of helping members of society live healthier, longer lives. More specifically, public health focuses on improving the general health of communities through efforts to monitor the spread of diseases, initiatives to prevent disease and disability, and by promoting healthy lifestyles through education and community engagement. It is practiced by multidisciplinary teams whose members' training spans a wide array of academic and vocational fields. The MPH degree program at NDSU draws faculty from: Epidemiology; Nursing; Medicine; and Social Science.

NDSU offers the Master of Public Health (MPH) degree with specializations in:

- Community Health Sciences
- Community Health Sciences - American Indian public health
- Epidemiology
- Epidemiology - Management of Infectious Diseases
- Epidemiology - American Indian public health

NDSU can offer you an MPH degree that will be the gateway to achieving your professional goals. It will take caring and hard-working people such as you to improve the public's health and to make a difference!

Department of Sociology and Anthropology

Department Information

- www.ndsu.edu/socanth (<http://www.ndsu.edu/socanth/>)

Undergraduate Programs of Study

- Anthropology (major, minor)
- Sociology (major, minor)
- Community Development (minor)
- Gerontology (minor)

Graduate Programs of Study

- Anthropology
- Sociology
- Community Development

Degrees Offered

- Master of Arts (M.A.)
- Master of Science (M.S.)

Department Description

The Department of Sociology and Anthropology offers courses and programs that focus on the study of human behavior in social settings. The department offers a major and minor in anthropology and sociology at the undergraduate level.

General Information

The department offers a wide range of part-time and full-time internships. Placements may include fieldwork in business, community agencies, health care, and agencies throughout the region. Upon approval of the student's application to the department and the sponsoring agency, students are placed in an environment in which both the applied and intellectual aspects of the professional experience are emphasized. The department also works with cooperative education (<https://www.ndsu.edu/career/internshipprogram/>) and service learning activities to support experiential education. Interested students should contact the department chair or Career Center (<https://www.ndsu.edu/career/>).

Department of Statistics

Department Information

- www.ndsu.edu/statistics (<http://www.ndsu.edu/statistics/>)

Undergraduate Programs of Study

- Behavioral Statistics (major)
- Statistics (major, minor)
- Statistics and Mathematics (dual major)
- Statistics and Mathematics with Pre-Actuarial option (dual major)

Graduate Programs of Study

- Applied Statistics
- Statistics

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Master of Science (M.S.)
- Doctor of Philosophy (Ph.D.)
- Graduate Certificate in Statistics
- Graduate Certificate in Big Data Applied Statistical Analysis

Department Description

Statistics involve the analysis of numerical data. This ranges from the calculation of simple statistics to the mathematical theory behind very sophisticated statistical procedures. Professionals in areas such as agriculture, pharmacy, business, human development, sports, and the social sciences use statistical tools.

There are excellent job opportunities in statistics. A statistician may:

1. consult in the design and analysis of clinical studies, evaluating new pharmaceutical agents;
2. serve as an opinion pollster for a public relations firm or a television network;
3. conduct reliability and quality control studies in various industries;
4. among others.

Statisticians work closely with other scientists and researchers to develop new statistical techniques, adapt existing techniques, design experiments and direct analyses of surveys and retrospective studies.

Department of Theatre Arts

Department Information

- www.ndsu.edu/performingarts/theatre/ (<http://www.ndsu.edu/performingarts/theatre/>)

Undergraduate Programs of Study

- Theatre Arts (major, minor)

Degrees Offered

- Bachelor of Arts (B.A.)
- Bachelor of Science (B.S.)
- Bachelor of Fine Arts (B.F.A.)

Department Description

The requirements for all degree tracks prepare students to be versatile life-long theatre artists through a rigorous, broad-based curriculum in theatre practice, theory, and history. Additional opportunities for specialized study are provided in the areas of acting, musical theatre, and design/technology. Through the course work students are given the opportunity to prepare the audition materials and/or portfolios necessary to enter professional theatre regionally and nationally.

Little Country Theatre, now known as **Theatre - NDSU** has been an important part of campus life at NDSU since 1914. Productions consists of **Theatre NDSU**, the student-run **Newfangled Theatre Company**, and the improv comedy troupe, **To Be Determined**. A typical season includes four fully produced

main-stage plays at least one of which is a musical, four newfangled productions, various student projects, and improv shows. Productions are chosen in such a way to expose the students to a variety of styles and genres through a four-year rotation of play styles. Students gain practical experiences through **Theatre - NDSU** which reflect the best of professional practices and current technology. In addition to academic course work, every theatre major is required to participate in some way in at least one **Theatre - NDSU** production per semester. Participation in **Theatre - NDSU** is open to all NDSU students regardless of major.

The Department of Theatre Arts is accredited by the National Association of Theatre Schools (NAST)), and hosts a student chapter of the United States Institute for Theatre Technology (USITT).

The Bachelor of Arts (B.A.) and the Bachelor of Science (B.S.) with a major in Theatre Arts are general baccalaureate degrees providing a liberal arts background with major emphasis in theatre. The Bachelor of Fine Arts (B.F.A.) with a major in Theatre Arts is a professionally-oriented program and can be entered only by audition. This degree program provides in-depth study of a theatre specialization: Performance, Musical Theatre, or Design/Technology.

A minor in Theatre Arts is available with a general studies emphasis, dance emphasis, or with selected electives a student could design a minor with an emphasis either in theatrical design and technical theatre, or in performance (acting and directing).

A student who wishes to teach theatre in high school should select a teaching major approved by the School of Education (<https://www.ndsu.edu/education/>) and compliment that major with a major or minor in Theatre Arts.

Courses for Theatre Arts majors and minors are grouped into tracks and emphasis areas.

Department of Transportation, Logistics and Finance

Undergraduate Programs of Study

- Finance (major, certificate)
- Banking (minor)

Graduate Programs of Study

- Supply Chain Management (masters)
- Transportation and Urban Systems (masters; masters of science)
- Transportation and Logistics

Degrees Offered

- Bachelor of Science (B.S.)
- Master of Supply Chain Management (MSCM)
- Master of Science (M.S.) of Transportation and Urban Systems
- Master of Transportation and Urban Systems (MTUS)
- Graduate Certificate in Enterprise Resource Planning (ERP)
- Graduate Certificate in Supply Chain Management
- Graduate Certificate in Transportation and Urban Systems
- Doctor of Philosophy (Ph.D.)

Department Description

The Department of Transportation, Logistics, and Finance is accredited by the Association for the Advancement of Collegiate Schools of Business (AACSB) International. The department offers a major in Finance. This students studying Finance often search employment as financial analysts or in corporations as financial officers. The department also offers a minor in banking which can be paired with any other major in the College of Business. These students usually seek employment in the banking industry. The department offers master's degrees in Supply Chain Management and Transportation and Urban Systems. These masters are designed for working professionals in the transportation industry and supply chain professions. Finally, the department offers a Ph.D. in Transportation and Logistics. Students who pursue a Ph.D. usually seek employment as a faculty member at other universities. All of the masters and doctoral program are Science, Technology, Engineering, and Mathematics (STEM) designated.

Practicum/Internships

Students majoring in Finance or minoring in Banking are encouraged to complete a practicum experience while enrolled in the professional program. The practicum prepares students for challenges of the business world through practical experience in their primary area of study. Students must consult with their faculty advisor and obtain approval prior to enrolling in the practicum. Credits will be applied as free electives in the major and do not satisfy any of the professional requirements listed on the curriculum guide.

Course Catalog Descriptions

- Course Definitions, Designators, and Format (p. 1076)
- Course Descriptions (p. 1078)

Course Definitions and Format

Courses approved at the time of publication are listed in this bulletin. Not all courses are offered every term. Refer to the online schedule of courses (<https://www.ndsu.edu/onestop/connect/schedule/>) and the student information system, Campus Connection, for course offerings. Credit cannot be earned twice by repeating a course unless the course description indicates otherwise.

Definitions

Course descriptions frequently include additional information about enrollment, such as prerequisites and co-requisites. Students are responsible for complying with restrictions or expectations related to course enrollment listed herein or in any supplementary information.

Course credits: Credits are stated in semester units as defined in the academic policies section in this bulletin.

Course prerequisites (Prereq): Prerequisites indicate the academic background, academic level, or other requirements considered necessary for enrollment in the course. Most prerequisites are specific courses, however, equivalent preparation is usually acceptable. Instructor or department permission may override a prerequisite.

Course co-requisites (Coreq): Co-requisites indicate courses to be taken concurrently with the course described. Instructor or department permission may override a co-requisite.

Cross-listed courses: A cross-listed course means the same course is offered by two or more departments or under another course prefix. Cross-listed courses are noted and the full description appears under the department responsible for the course. Credit may only be earned for the course under one prefix.

Dual-listed courses: Dual-listed courses with 400- or 500- and 600-level course numbers permit undergraduate and graduate students in the same class. The same amount of credit for the course is earned by all students, but additional work is required of students enrolled under the graduate level number. Credit may only be earned for the course at one of the levels.

Format of Course Listings

All university course offerings, listed alphabetically by areas of study, are described in the section titled Course Catalog Descriptions (p. 1078). Course information and course availability is subject to change. The heading, which precedes the brief description of each course, includes the current course number; course title; and the number of fixed or variable semester credit hours. The frequency the course is offered may appear at the end of the description. F = Fall, S = Spring, SS = Summer Session. Terms presented in a fraction indicate course is offered alternate years. F/2 = every other Fall semester.

Course Numbers

Course numbers indicate the student classification for which the course is primarily intended. Some course numbers end with a letter suffix: L - laboratory course; R - recitation (undergraduate) or research continuation (graduate); S - graduate project. The number system is as follows:

- 0-99 series courses - developmental; non-degree eligible
- 100 series courses - primarily for freshmen
- 200 series courses - primarily for sophomores
- 300 series courses - primarily for juniors
- 400 series courses - primarily for seniors
- 500-599 series courses - post-baccalaureate professional courses
- 601-699 series courses - graduate courses taught concurrently in the same classroom with advanced undergraduates at the 400 or 500 level
- 700-799 series courses - open to graduate students
- 800-899 series courses - predominantly intended for doctoral level graduate students
- 2000 numbered courses - Continuing Education post-baccalaureate courses, not applicable toward graduate degrees

Graduate standing is required for 600-700 level courses unless prior approval to use the course for an undergraduate program of study is granted by the department/instructor.

Uniform Course Numbers

The following courses may be offered by departments but are described here because of their uniform numbers and descriptions.

(Prefix) 179, 279, 379, 479, and 679

Global Seminar, 1-6

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Prerequisite: Prior approval by the International Student and Study Abroad Services and major department. May be repeated.

(Prefix) 189

Skills for Academic Success, 1

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

(Prefix) 191, 291, 391, 491, 590, 690, 790, 890

Seminar, 1-5

A group of students engaged, under a professor or professors, in research or criticism and in presentation of reports pertaining thereto.

(Prefix) 292, 392, 492, 692

Global Practicum: Study Abroad, 1-15

Pre-arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange), or on approved study abroad programs. Prerequisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (undergraduate) or 'S' or 'U' (graduate).

(Prefix) 193, 293, 393, 493

Undergraduate Research, 1-5

Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

(Prefix) 194, 294, 394, 494

Individual Study, 1-5

Individual student work on research or criticism under the supervision of a professor.

(Prefix) 196, 296, 396, 496, 595, 695, 795, 895

Field Experience/Practicum, 1-15

Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

(Prefix) 297, 397, 497, 897

Cooperative Education, 1-4

Practical application of classroom learning through employment in supervised career-related positions. Students are granted full-time student status by the University regardless of the actual credit hours. Requires departmental approval and Co-op Program application. Graded 'P' or 'F' (undergraduate) or 'S' or 'U' (graduate).

(Prefix) 199, 299, 399, 499 596, 696, 796, 896

Special Topics, 1-5

A group study of the known and established literature of a field, or other evidence, for purposes of scholarly development.

(Prefix) 592

Case Studies, 1-3

Critical review, analysis, and evaluation of selected topics by individual presentations and group discussions. Case study topics are indicated by title on the student's transcript. Graded 'S' or 'U'.

(Prefix) 593, 793, 893

Individual Study/Tutorial, 1-5

Directed study allowing an individual student under faculty supervision to undertake selected, independent work in topics of special interest or a limited experience in research. Requires departmental approval.

(Prefix) 594, 794, 894

Internship, 1-8

Course designed to provide practical participation under professional supervision in selected situations to gain experience in the application of concepts, principles, and theories related to the student's area of specialization. Requires approved program and consent of instructor. Graded 'S' or 'U'.

(Prefix) 791, 891

Temporary/Trial Topics, 1-5

University-wide course focused on group study involving critical examination and discussion of subject matter selected for proposal as a temporary or trial course.

(Prefix) 792, 892

Student Teaching, 1-6

Graduate student teaching experiences for professional development. Graded 'S' or 'U'.

(Prefix) 797

Master's Paper, 1-3

Literature review, research, and preparation for paper required for the comprehensive study option. Graded 'S' or 'U'.

(Prefix) 797S

Comprehensive Project, 1-6

An in-depth research study/project in a graduate student's field of study. Prerequisite: Graduate standing.

(Prefix) 798

Master's Thesis, 1-10

Original investigation under the supervision of a major adviser and a supervisory committee. Graded 'S' or 'U'.

(Prefix) 798S

Specialist Field Study, 1-6

(Prefix) 799

Master's Examination, 1-6

Literature review, research, and preparation for the master's examination option.

(Prefix) 799S

Clinical Dissertation, 1-15

The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

(Prefix) 899

Doctoral Dissertation, 1-15

Original investigation under the supervision of a major adviser and an advisory committee. Graded 'S' or 'U'.

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Accounting (ACCT)

ACCT 102. Fundamentals of Accounting. 3 Credits.

Introduces financial statements and other accounting information to make personal and business decisions. Not available to majors and accounting minors in the College of Business Administration. Student may not have previously passed or be concurrently enrolled in ACCT 201.

ACCT 194. Individual Study. 1-3 Credits.

ACCT 196. Field Experience. 1-15 Credits.

ACCT 199. Special Topics. 1-5 Credits.

ACCT 200. Elements of Accounting I. 3 Credits.

An introduction to accounting to enable the student to achieve a working knowledge of accounting and its uses. ACCT 200 emphasizes the basic concepts and approaches of accounting applied to businesses, the accounting cycle, and the preparation of the income statement and balance sheet. Co-req: MIS 116.

ACCT 201. Elements of Accounting II. 3 Credits.

Building on ACCT 200, ACCT 201 emphasizes the use of accounting information as a basis for decision-making. Topics include the statement of cash flows, financial statement analysis, and managerial accounting (budgeting, job-order costing, cost-volume-profit analysis, short-term decision making, and capital budgeting). Prereq: ACCT 200.

ACCT 291. Seminar. 1-3 Credits.

ACCT 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 294. Individual Study. 1-3 Credits.**ACCT 299. Special Topics. 1-5 Credits.****ACCT 311. Intermediate Accounting I. 4 Credits.**

Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving issues in accounting. Prereq: ACCT 200 with a minimum grade of B. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 312. Intermediate Accounting II. 4 Credits.

Intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination, and other evolving issues in accounting. Prereq: ACCT 311 with a grade of C or better. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 318. Taxation in Management Decisions. 3 Credits.

Study of the fundamental concepts of tax implications that result from common business transactions. Prereq: ACCT 102 or ACCT 201. Cross-listed with BUSN 318. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 320. Cost Management Systems. 3 Credits.

Study of cost management methods used to assign costs, and plan and evaluate business activities. Prereq: ACCT 200 and ACCT 201 both with a grade of B or higher and students must be College of Business professional major or minor and have a 2.50 minimum NDSU grade point average.

ACCT 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ACCT 391. Seminar. 1-3 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 397. Fe/Coop Ed/Internship. 1-4 Credits.**ACCT 399. Special Topics. 1-5 Credits.**

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 410. Fraud Examination. 3 Credits.

Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. Prereq: A grade of B or higher in both ACCT 200 and ACCT 201 and students must be a College of Business professional major or minor and must have a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 610.}.

ACCT 411. Advanced Fraud Examination. 3 Credits.

Advanced application of fraud examination principles that encompass the investigation and prevention of fraudulent financial transactions. Coursework is focused on the analysis of fraudulent financial statements and fieldwork involving actual organizations. Prereq: ACCT 410. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 611.}.

ACCT 413. Accounting Internship. 3 Credits.

Supervised professional experience in a non-paid position. May be repeated.

ACCT 415. Advanced Accounting. 3 Credits.

Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. Prereq: ACCT 312 with a grade of C or better. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 615.}.

ACCT 418. Tax Accounting I. 3 Credits.

Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Prereq: A grade of C or better in ACCT 311. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 618.}.

ACCT 419. Tax Accounting II. 3 Credits.

Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: ACCT 418. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 619.}.

ACCT 420. Accounting Information Systems. 3 Credits.

Study of conceptual and practical aspects of accounting information systems with a focus on business processes. Practical application includes use of software in a lab setting. Prereq: ACCT 311 with a grade of C or better and MIS 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 620.}.

ACCT 421. Auditing I. 3 Credits.

Study of audit principles and practices including evidence gathering, internal controls, sampling and testing, report writing, ethics and legal liabilities. Prereq: ACCT 311 with a grade of C or better . Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 621.}.

ACCT 425. Government and Not-For-Profit Accounting. 3 Credits.

Study of accounting standards and procedures applicable to government and not-for-profit institutions. Prereq: ACCT 311 with a grade of C or better. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 625.}.

ACCT 440. Management Control Systems. 3 Credits.

Study of the role of cost management analysts in the design, implementation, and use of management control systems. Prereq: ACCT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 640.}.

ACCT 455. Advanced Projects using Excel. 3 Credits.

This course focuses on techniques, analytic methods, and advanced Excel skills to construct well-designed spreadsheets and visuals valuable for decision-making using a case-based method. Cases are accounting and business related and represent unstructured problems faced in industry. Prereq: ACCT 455: A grade of B or higher in both ACCT 200 and ACCT 201 and students must be a College of Business professional major or minor and must have a 2.50 minimum NDSU grade point average. Recommended grade of C or better in ACCT 311.

ACCT 491. Seminar. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ACCT 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 496. Field Experience. 1-15 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 499. Special Topics. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

ACCT 595. Field Experience. 1-15 Credits.**ACCT 596. Special Topics. 1-5 Credits.****ACCT 610. Fraud Examination. 3 Credits.**

Study of the pervasiveness and causes of fraud in society; examination of methods of fraud detection and prevention, and on the investigation of financial statement fraud. {Also offered for undergraduate credit - see ACCT 410.}.

ACCT 611. Advanced Fraud Examination. 3 Credits.

Advanced application of fraud examination principles that encompass the investigation and prevention of fraudulent financial transactions. Coursework is focused on the analysis of fraudulent financial statements and fieldwork involving actual organizations. {Also offered for undergraduate credit - see ACCT 411.}.

ACCT 615. Advanced Accounting. 3 Credits.

Study of advanced topics including consolidated statements, international operations, and derivative financial instruments. {Also offered for undergraduate credit - see ACCT 415.}.

ACCT 618. Tax Accounting I. 3 Credits.

Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for individuals. Students will prepare manual and computerized tax returns. {Also offered for undergraduate credit - see ACCT 418.}.

ACCT 619. Tax Accounting II. 3 Credits.

Study of the theory and principles related to the determination of taxable income and computation of federal income taxes for partnerships, corporations, trusts and estates, and other specialized tax issues. Prereq: ACCT 618. {Also offered for undergraduate credit - see ACCT 419.}.

ACCT 620. Accounting Information Systems. 3 Credits.

Study of conceptual and practical aspects of accounting information systems with a focus on business processes. Practical application includes use of software in a lab setting. {Also offered for graduate credit - see ACCT 420 .}.

ACCT 621. Auditing I. 3 Credits.

Study of audit principles and practices including evidence gathering, internal controls, sampling and testing, report writing, ethics and legal liabilities. {Also offered for undergraduate credit - see ACCT 421.}.

ACCT 625. Government and Not-for-Profit Accounting. 3 Credits.

Study of accounting standards and procedures applicable to government and not-for-profit institutions. {Also offered for undergraduate credit - see ACCT 425.}.

ACCT 640. Management Control Systems. 3 Credits.

Study of the role of cost management analysts in the design, implementation, and use of management control systems. {Also offered for undergraduate credit - see ACCT 440.}.

ACCT 695. Field Experience. 1-15 Credits.**ACCT 696. Special Topics. 5.00 Credits.****ACCT 700. Accounting for Decision Making. 3 Credits.**

Acct 700 is a graduate course for students who do not have an undergraduate business degree. The course examines the basics of what accounting information is, how it is developed, how it is used, and what it means. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 701. Financial Reporting I. 3 Credits.

In this class students will engage in an intensive study of corporate accounting problems, financial statements and disclosures, and other evolving issues in accounting. The emphasis is on the assets section of the balance sheet. Prereq: ACCT 700. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 702. Financial Reporting II. 3 Credits.

In this class students will engage in an intensive study of accounting theories, corporate accounting problems, financial statements and disclosures, problems in income determination and other evolving issues in accounting. The emphasis is on the liabilities and stockholders' equity section of the balance sheet and special accounting issues such as revenue recognition and leasing. Prereq: ACCT 701. Restrictions: Admittance to class by approval of the Master of Accountancy director.

ACCT 722. Auditing II. 3 Credits.

Advanced application of audit principles in organizational situations through case studies and the investigation of current issues in auditing. Prereq: ACCT 621 and approval of the MAcc Program Director.

ACCT 725. International Financial Reporting Standards. 3 Credits.

Introduces the conceptual framework of International Financial Reporting Standards (IFRS) and compares the differences in accounting standards between U.S. GAAP and IFRS. Available to accounting major graduate students with intermediate accounting background.

ACCT 730. Legal Aspects of Business. 3 Credits.

This course will study law related to business in the areas of agency, accountant legal liability, business organizations, contracts, debtor-creditor relationships, government regulations of business transactions, real property, sales, and the Uniform Commercial Code.

ACCT 735. Applied Professional Research. 3 Credits.

This course will emphasize substantive accounting questions and issues that arise in practice. Professional research methods will be used to solve cases addressing these questions. Teamwork, communication skills, and analytical skills required of contemporary accounting practitioners will be developed.

ACCT 750. Accounting Theory. 3 Credits.

This course will examine the conceptual underpinnings of accounting, the development of those concepts, and accounting issues as related to contemporary financial reporting.

ACCT 755. Financial Statement Analysis. 3 Credits.

This course is the study of conceptual and practical aspects of the financial information in corporate annual reports. The course focuses on the interpretation and critical evaluation of financial information, rather than the mechanics of preparing financial reports.

ACCT 793. Individual Study/Tutorial. 1-5 Credits.**ACCT 795. Field Experience. 1-15 Credits.****ACCT 796. Special Topics. 1-5 Credits.**

Aerospace Studies (AS)

AS 110. Air Force ROTC Fitness I/II. 0 Credits.

Introduction to various AFROTC team sports. Promotes benefits of being physically fit and maintaining Air Force fitness standards. May be repeated for credit.

AS 111. Heritage and Values I Fall. 1 Credit.

AS 111 is a survey course designed to introduce students to the United States Air and Space Forces and provides an overview of the basic characteristics, missions, and organization of the Air and Space Forces.

AS 112. Heritage and Values II. 1 Credit.

AS 112 is a survey course designed to introduce students to the United States Air and Space Forces and provides an overview of the basic characteristics, missions, and organization of the Air and Space Forces.

AS 194. Individual Study. 1-3 Credits.**AS 196. Field Experience. 1-15 Credits.****AS 199. Special Topics. 1-5 Credits.****AS 210. Leadership Laboratory. 0 Credits.**

This course is a dynamic and integrated grouping of leadership developmental activities designed to meet the needs and expectations of prospective Department of the Air Force second lieutenants and complement the AFROTC academic program. It is a student planned, organized, and executed practicum conducted under the supervision of the Detachment Commander and Operations Flight Commander. For AS 100/200 level cadets. May be repeated for credit.

AS 211. Team and Leadership Fundamentals I. 1 Credit.

AS 211 provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for field training and leadership positions in the detachment.

AS 212. Team and Leadership Fundamentals II. 1 Credit.

AS 212 provides a fundamental understanding of both leadership and team building. The lessons and course flow are designed to prepare students for field training and leadership positions in the detachment.

AS 291. Seminar. 1-3 Credits.**AS 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 294. Individual Study. 1-5 Credits.**AS 299. Special Topics. 1-5 Credits.****AS 321. Leading People and Effective Communication I. 3 Credits.**

AS 321 utilizes students' field training experience to take a more in-depth look at leadership. Special emphasis is placed on enhancing communication skills and why that is important as a leader. Students have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 322. Leading People and Effective Communication II. 3 Credits.

AS 322 utilizes students' field training experience to take a more in-depth look at leadership. Special emphasis is placed on enhancing communication skills and why that is important as a leader. Students have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors.

AS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AS 391. Seminar. 1-3 Credits.**AS 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 394. Individual Study. 1-5 Credits.**AS 399. Special Topics. 1-5 Credits.****AS 410. Leadership Laboratory. 0 Credits.**

AS 410 is a dynamic and integrated grouping of leadership developmental activities designed to meet the needs and expectations of prospective Department of the Air Force second lieutenants and complement the AFROTC academic program. It is a student planned, organized, and executed practicum conducted under the supervision of the Detachment Commander and Operations Flight Commander. For AS 300/400 level cadets. May be repeated for credit.

AS 441. National Security/Commissioning Preparation I. 3 Credits.

AS 441 is designed for college seniors and gives them the foundation to understand their role as military officers and how they are directly tied to our National Security Strategy. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. Prereq: AS 111, AS 112, AS 211, AS 212, AS 321, AS 322.

AS 442. National Security/Commissioning Preparation II. 3 Credits.

AS 442 is designed for college seniors and gives them the foundation to understand their role as military officers and how they are directly tied to our National Security Strategy. It is an overview of the complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. Prereq: AS 111, AS 112, AS 211, AS 212, AS 321, AS 322, AS 441.

AS 491. Seminar. 1-5 Credits.**AS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AS 494. Individual Study. 1-5 Credits.**AS 496. Field Experience. 1-15 Credits.****AS 499. Special Topics. 1-5 Credits.**

Agribusiness & Applied Economics (AGEC)

AGEC 194. Individual Study. 1-3 Credits.**AGEC 196. Field Experience. 1-15 Credits.****AGEC 199. Special Topics. 1-5 Credits.****AGEC 242. Introduction to Agricultural Management. 3 Credits.**

Economic and managerial concepts related to farm or agribusiness production process, development of cost data, enterprise analysis, organization and management of production inputs. 3 lectures.

AGEC 244. Agricultural Marketing. 3 Credits.

Study of the agricultural marketing system to include cash marketing, commodity futures trading, branded products merchandising and the interrelationship of the government and international trade. 3 lectures.

AGEC 246. Introduction to Agricultural Finance. 3 Credits.

Introduction to agricultural finance; provides background in farm and agribusiness credit use and evaluation. Discussion of specific financial conditions on farms and in agribusiness. A financial calculator will be required for this course. 3 lectures.

AGEC 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGEC 294. Individual Study. 1-5 Credits.**AGEC 299. Special Topics. 1-5 Credits.****AGEC 339. Quantitative Methods & Decision Making. 3 Credits.**

Application of basic probability concepts to decision analysis, introduction to linear programming models, forecasting, and project management. 3 lectures. Prereq: ECON 201 and MATH 144 or higher and CSCI 116 or MIS 116.

AGEC 342. Farm and Agribusiness Management II. 3 Credits.

Application of production economics principles to farm and agribusiness operations. Economic input-output principles and profit maximization. 3 lectures. Prereq: AGEC 242.

AGEC 343. Introduction to Commodity Trading. 3 Credits.

To learn mechanics of commodity information and technology in the commodity trading room (CTR). Emphasis will be on information, extracting information and analysis, as well as trading and risk management. Co-req: MIS 116.

AGEC 344. Agricultural Price Analysis. 3 Credits.

Introduction to price analysis in agricultural markets. 3 lectures. Prereq: AGEC 244.

AGEC 346. Applied Risk Analysis. 3 Credits.

Development of tools to analyze business and financial risk problems unique to farms and agribusinesses. 3 lectures. Prereq: STAT 330.

AGEC 347. Principles of Real Estate. 3 Credits.

Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. Prereq: ECON 201. Cross-listed with BUSN 347.

AGEC 350. Agrisales. 3 Credits.

The principles of salesmanship applied to the agricultural business. Topics include attitudes and value systems, basic behavioral patterns, relationship of sales to marketing, selling strategies, preparing for sales calls, making sales presentations, and closing sales. 3 lectures.

AGEC 356. Advanced Agricultural Lending. 3 Credits.

Application of credit analysis principles including loan structure, financial analysis, borrower-lender relationship, legal aspect of lending, collateral valuation, and role of financial intermediaries in agriculture. Prereq: ECON 201 and AGEC 246 or FIN 320.

AGEC 360. International Agribusiness Experience. 3 Credits.

Provides students an applied context for analyzing international agribusiness. Students participate in a self- or pre-arranged experience and research an agribusiness topic in depth prior to and while studying in a foreign country.

AGEC 371. Export Management. 3 Credits.

Survey of practices that facilitate increasing a business' export activities, with emphasis on how a business plans to expand its import opportunities.

AGEC 375. Applied Agricultural Law. 3 Credits.

Study of laws affecting agriculture and agribusiness including property ownership, financial relations, and environmental regulation.

AGEC 378. Introduction to Transportation & Logistics. 3 Credits.

Presents the role and importance of transportation, with detailed discussion of the various modes and their specific characteristics. Covers basic logistics concepts in addition to transportation, including inventory, warehousing, and location decisions. Prereq: ECON 201.

AGEC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AGEC 393. Undergraduate Research. 1-5 Credits.**AGEC 394. Individual Study. 1-5 Credits.****AGEC 396. Field Experience. 1-15 Credits.****AGEC 397. Fe/Coop Ed/Internship. 1-4 Credits.****AGEC 399. Special Topics. 1-5 Credits.****AGEC 420. Integrated Farm and Ranch Management. 3 Credits.**

Intended for persons who will advise or manage farm and ranch operations. Application of all phases of management (including marketing, finance) to crop and livestock production practice. 2 lectures, 1 laboratory. Prereq: AGEC 242, AGEC 244, or AGEC 246.

AGEC 444. Advanced Commodity Trading. 3 Credits.

Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. Prereq: STAT 331 or ECON 410. Coreq: AGEC 339. {Also offered for graduate credit - see AGEC 644.}.

AGEC 445. Agribusiness Industrial Strategy. 3 Credits.

The course integrates industrial organization topics with specific applications to agribusiness strategy problems. Focus is on industry analysis and issues in competition, strategy, and rivalry from an agribusiness perspective. Prereq: AGEC 344. Coreq: AGEC 339.

AGEC 446. Agribusiness Finance. 3 Credits.

Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. Prereq: AGEC 339. Co-req: AGEC 346. {Also offered for graduate credit - see AGEC 646.}.

AGEC 450. National AgriMarketing Association (NAMA) I. 1 Credit.

Learn the components of an agribusiness marketing plan and apply this knowledge in the development of a marketing plan for a selected product. 1 lecture. May be repeated for credit.

AGEC 451. National AgriMarketing Association (NAMA) II. 1 Credit.

Review the components of an agribusiness marketing plan. Work in teams to prepare written and oral marketing plans for the National NAMA student chapter competition. 1 lecture. May be repeated for credit. Recommended prereq: AGEC 450.

AGEC 452. Food Laws & Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy.

AGEC 472. Advanced Logistical Analysis. 3 Credits.

Presents major analytical tools and methods used in analyzing logistical strategies. Course emphasis is on application of analytical tools used in quantifying logistical problems by manufacturing, trading, and shipping firms. Prereq: AGEC 378 and AGEC 339 or MGMT 360.

AGEC 474. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Prereq: ECON 201. Cross-listed with BUSN 474. {Also offered for graduate credit - see AGEC 674.}.

AGEC 484. Agricultural Policy. 3 Credits.

Analysis of the evolution and development of federal food, natural resource, and trade policies and their consequences on the agricultural sector. Exploration of how microeconomic forces influence formulation of macroeconomic agricultural policy. Prereq: ECON 201, Junior standing.

AGEC 491. Seminar. 1-5 Credits.**AGEC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGEC 494. Individual Study. 1-5 Credits.**AGEC 496. Field Experience. 1-15 Credits.****AGEC 499. Special Topics. 1-5 Credits.****AGEC 644. Advanced Commodity Trading. 3 Credits.**

Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops. 2 lectures. {Also offered for undergraduate credit - see AGECE 444.}.

AGEC 646. Agribusiness Finance. 3 Credits.

Application of financial theory to investment and liability management problems of agribusiness and farm firms. Characteristics, operations, and management of agricultural financial institutions. 3 lectures. {Also offered for undergraduate credit - see AGECE 446.}.

AGEC 652. Food Laws & Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. Cross-listed with CFS 652 and SAFE 652. {Also offered for undergraduate credit - see AGECE 452.}.

AGEC 674. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with BUSN 674. F, S, Su. {Also offered for undergraduate credit - see AGECE 474.}.

AGEC 690. Graduate Seminar. 1-3 Credits.**AGEC 695. Field Experience. 1-15 Credits.****AGEC 696. Special Topics. 1-5 Credits.****AGEC 701. Research Philosophy. 1 Credit.**

Role of the scientist, reasoning, values, and decisions. Problem formulation, literature review, hypothesis development, data collection, analysis, and interpretation. 1 lecture.

AGEC 711. Applied Risk Analysis I. 3 Credits.

Conceptual foundations of risk, stochastic simulation using @Risk and Model Risk, finance, trading, and strategy are presented. Emphasis is placed on financial instruments, planning for agribusiness firms, trading and risk management in agricultural commodities.

AGEC 712. Applied Risk Analysis II. 3 Credits.

Conceptual foundations of risk are presented and applied to production, financial and institutional risk problems. Emphasis is placed on the development and understanding of risk theory; risk assessment and measures, response to risk and risk management tools - with emphasis on portfolio diversification principles/theory of insurance. Prereq: AGECE 711.

AGEC 720. Food Safety Costs and Benefits Analysis. 3 Credits.

Theoretical and empirical impacts of food safety costs and benefits. Three lectures. Prereq: SAFE 670, AGECE 741. Cross-listed with SAFE 720.

AGEC 725. Food Policy. 3 Credits.

Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with SAFE 725 and CFS 725.

AGEC 739. Analytical Methods for Applied Economics. 3 Credits.

Study and application of operations research techniques and other decision methods to problems in agriculture, transportation, and resource management. 3 lectures.

AGEC 741. Advanced Microeconomics. 3 Credits.

Advanced analysis of demand, production, and costs; pricing output and resource allocation under various market structures.

AGEC 743. Advanced Macroeconomics. 3 Credits.

Advanced analysis of macroeconomic theories; economic growth, business fluctuations, and inflation.

AGEC 744. Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy. 3 Credits.

Conceptual foundations of agribusiness strategy, food product marketing, and strategic planning are presented. Emphasis is placed on quantitative strategic decision making for the agribusiness firm.

AGEC 771. Economics of Transportation Systems. 3 Credits.

The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with CE 771.

AGEC 790. Graduate Seminar. 1-3 Credits.

AGEC 791. Temporary/Trial Topics. 1-5 Credits.

AGEC 793. Individual Study/Tutorial. 1-5 Credits.

AGEC 794. Practicum/Internship. 1-15 Credits.

AGEC 795. Field Experience. 1-15 Credits.

AGEC 796. Special Topics. 1-5 Credits.

AGEC 797. Master's Paper. 1-3 Credits.

AGEC 797S. Comprehensive Project. 1-6 Credits.

AGEC 798. Master's Thesis. 1-10 Credits.

AGEC 892. Graduate Teaching Experience. 1-6 Credits.

Agricultural & Biosystems Engineering (ABEN)

ABEN 110. Introduction to Agricultural and Biosystems Engineering. 3 Credits.

Introduction to agricultural and biosystems engineering (ABEN) for students interested in pursuing the major and profession. Content emphasizes ABEN sub-disciplines through engineering problem solving and introductory design. 2 lectures. 1 laboratory. Prereq: MATH 103 or MATH 107.

ABEN 194. Individual Study. 1-3 Credits.

ABEN 196. Field Experience. 1-15 Credits.

ABEN 199. Special Topics. 1-5 Credits.

ABEN 255. Computer Aided Analysis & Design. 3 Credits.

Application and use of software for engineering design, analysis, and graphical communication. 2 lectures. F.

ABEN 263. Biological Materials Processing. 3 Credits.

Quantitative analysis of processing systems for food, biofuels and bioproducts using principles of mass and energy balances, fluid flow, steam properties and heat and mass transfer. 2 lectures, 1 three-hour laboratory. Prereq: ABEN 255. Co-req: ME 221. S.

ABEN 291. Seminar. 1-3 Credits.

ABEN 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 294. Individual Study. 1-3 Credits.

ABEN 299. Special Topics. 1-5 Credits.

ABEN 358. Electric Energy Application in Agriculture. 3 Credits.

Basic principles of electricity, electrical wiring, electrical power distribution/services, electrical load calculations, lighting, motor and standby electric generator selection, solar and wind power principles, solid-state and electromagnetic sensors, electrical safety, Variable Frequency Drives (VFD), and Programmable Logic Controller (PLC). 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252.

ABEN 377. Numerical Modeling in Agricultural and Biosystems Engineering. 3 Credits.

Numerical modeling using finite element and other techniques. Engineering applications include modeling of stress/strain, heat, and mass transfer in physical, natural resource, and biological systems such as grain and food products. 3 lectures. Prereq: MATH 266, ME 223. S.

ABEN 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ABEN 391. Seminar. 1-3 Credits.

ABEN 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 394. Individual Study. 1-5 Credits.**ABEN 397. Fe/Coop Ed/Internship. 1-4 Credits.****ABEN 399. Special Topics. 1-5 Credits.****ABEN 444. Transport Processes. 3 Credits.**

Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. Prereq: MATH 266 and CE 309 or ME 352 and ABEN 263. {Also offered for graduate credit - see ABEN 644.}.

ABEN 452. Bioenvironmental Systems Design. 3 Credits.

Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. Prereq: CE 309 or ME 350. F {Also offered for graduate credit - see ABEN 652.}.

ABEN 456. Biobased Energy. 3 Credits.

Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for graduate credit - see ABEN 656.}.

ABEN 458. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.

Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. 3 lectures. Prereq: ABEN 263. F {Also offered for graduate credit - see ABEN 658.}.

ABEN 464. Resource Conservation and Irrigation Engineering. 4 Credits.

Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. Prereq: CE 309. {Also offered for graduate credit - see ABEN 664.}.

ABEN 473. Agricultural Power. 3 Credits.

Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. Prereq: ME 350. F {Also offered for graduate credit - see ABEN 673.}.

ABEN 478. Machinery Analysis & Design. 3 Credits.

Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. Prereq: ME 223. S {Also offered for graduate credit - see ABEN 678.}.

ABEN 479. Fluid Power Systems Design. 3 Credits.

Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Prereq: ME 352. Cross-listed with ME 479. {Also offered for graduate credit - see ABEN 679.}.

ABEN 482. Instrumentation & Measurements. 3 Credits.

Application of instrumentation and sensor concepts to measurement and control of environmental, biological, and mechanical parameters. Includes sensor principles, signal conditioning, data collection, and data analysis methods. 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252. S {Also offered for undergraduate credit - see ABEN 682.}.

ABEN 484. Drainage and Wetland Engineering. 3 Credits.

Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. Prereq CE 309 or SOIL 433. {Also offered for graduate credit - see ABEN 684.}.

ABEN 486. Design Project I. 2 Credits.

Capstone learning experience involving principles of design, project management, and evaluation. Student teams define a capstone project in their area of interest. 2 lecture/laboratory. Prereq: ABEN 263 and Senior standing.

ABEN 487. Design Project II. 2 Credits.

Continuation and completion of the capstone learning experience begun in ABEN 486. Communication in oral, written, and graphic forms is emphasized. 2 lectures/laboratories. Prereq: ABEN 486. S.

ABEN 491. Seminar. 1-5 Credits.**ABEN 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ABEN 494. Individual Study. 1-5 Credits.**ABEN 496. Field Experience. 1-15 Credits.****ABEN 499. Special Topics. 1-5 Credits.****ABEN 644. Transport Processes. 3 Credits.**

Topics covered include modes and equations of energy and mass transport processes, transport properties of biomaterials and porous media, formulations of and solutions to energy and mass transfer problems, and engineering design considerations. {Also offered for undergraduate credit - see ABEN 444.}.

ABEN 652. Bioenvironmental Systems Design. 3 Credits.

Study of psychrometrics, heat and mass transfer, and physiological requirements for livestock and bioproducts. Design of environmental modifications, livestock wastes and control systems. 3 lectures. F {Also offered for undergraduate credit - see ABEN 452.}.

ABEN 656. Biobased Energy. 3 Credits.

Topics to be addressed include: benefits and limitations of biobased energy development; resource potential; biomass production, harvest, storage, and transportation issues; and conversion technologies (e.g. combustion, pyrolysis, gasification, starch and cellulosic ethanol production; biodiesel production; and anaerobic digestion). Prereq: Junior standing in science or engineering. {Also offered for undergraduate credit - see ABEN 456.}.

ABEN 658. Process Engineering for Food, Biofuels and Bioproducts. 3 Credits.

Analysis and design of processing systems to preserve, purify and/or transform biological materials and products, especially through refrigeration, freezing, sterilization, aseptic processing, dehydration, extraction, distillation and chemical reaction. F {Also offered for undergraduate credit - see ABEN 458.}.

ABEN 664. Resource Conservation and Irrigation Engineering. 4 Credits.

Engineering principles and design of systems for soil and water resource management and environmental protection. 3 lectures, 1 three-hour laboratory. {Also offered for undergraduate credit - see ABEN 464.}.

ABEN 673. Agricultural Power. 3 Credits.

Theory, analysis, and testing of internal combustion engines, traction, power trains, hydraulic systems, vehicle dynamics, stability, and ergonomics in tractor design. Electrical power units including motors. Alternative energy systems. 2 lectures, 1 three-hour laboratory. F {Also offered for undergraduate credit - see ABEN 473 .}.

ABEN 678. Machinery Analysis & Design. 3 Credits.

Principles of design, development, and testing of agricultural machines and machine systems. Applications of computer aided design and FMEA. S {Also offered for undergraduate credit - see ABEN 478 .}.

ABEN 679. Fluid Power Systems Design. 3 Credits.

Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and system for power transmission and control purposes. Cross-listed with ME 679. {Also offered for undergraduate credit - see ABEN 479 .}.

ABEN 682. Instrumentation & Measurements. 3 Credits.

Application of instrumentation and sensor concepts to measurement and control of environmental, biological, and mechanical parameters. Includes sensor principles, signal conditioning, data collection, and data analysis methods. 2 lectures, 1 three-hour laboratory. S {Also offered for undergraduate credit - see ABEN 482.}.

ABEN 684. Drainage and Wetland Engineering. 3 Credits.

Drainage and wetland engineering principles, design, and water quality for agricultural and natural resources applications. Topics include soil, water, and plant relationships, water movement in soils, water quality (nitrogen and salinity), surface drainage, subsurface drainage and its modeling, and wetlands. {Also offered for undergraduate credit - see ABEN 484.}.

ABEN 690. Graduate Seminar. 1-3 Credits.**ABEN 696. Special Topics. 1-5 Credits.****ABEN 747. Numerical Modeling of Environmental and Biological Systems. 3 Credits.**

Numerical methods of systems analysis will be taught through real-world case studies. Topics covered include simplification and mathematical description of real systems; the finite-difference methods for solving differential equations; and parameter estimation sensitivity analysis, and uncertainty analysis methods. S (even years).

ABEN 750. Bioprocess Engineering. 3 Credits.

Application of biological, biochemical, and engineering fundamentals for industrial bioprocessing. Topics include bioprocessing kinetics (enzymes, cell growth, substrate utilization, and product formation); bioenergetics; bioreactor selection and scale-up; and product recovery.

ABEN 758. Applied Computer Imaging and Sensing for Biosystems. 3 Credits.

Sensors and non-destructive sensing principles (e.g., computer vision, spectroscopy, imaging, fiber optic sensing) for bioproduction and processing applications. Data/signal acquisition, signal conditioning/analysis techniques, signal interpretation, and pattern recognition using statistical, neural networks, and fuzzy logic techniques.

ABEN 765. Small Watershed Hydrology and Modeling. 3 Credits.

Study and representation of hydrologic processes on small watersheds. Application of hydrologic models for surface flow, subsurface flow, nutrient and sediment transport, and water quality. Prereq: ABEN 664. F (odd years).

ABEN 790. Graduate Seminar. 1-3 Credits.

ABEN 791. Temporary/Trial Topics. 1-5 Credits.

ABEN 793. Individual Study/Tutorial. 1-5 Credits.

ABEN 795. Field Experience. 1-15 Credits.

ABEN 796. Special Topics. 1-5 Credits.

ABEN 797. Master's Paper. 1-3 Credits.

ABEN 798. Master's Thesis. 1-10 Credits.

ABEN 899. Doctoral Dissertation. 1-15 Credits.

Agricultural Systems Management (ASM)

ASM 115. Fundamentals of Agricultural Systems Management. 3 Credits.

Overview of agricultural systems management; engines, machinery, structures, electricity, processing, and conservation. 3 lectures. Co-req: MATH 103 or MATH 104 or MATH 107 or placement.

ASM 125. Fabrication & Construction Technology. 3 Credits.

Introduction to materials, methods, and tools used in fabrication, installation, and maintenance of agricultural production and processing facilities. 2 lectures, 1 three-hour laboratory.

ASM 194. Individual Study. 1-3 Credits.

ASM 196. Field Experience. 1-15 Credits.

ASM 199. Special Topics. 1-5 Credits.

ASM 225. Computer Applications in Agricultural Systems Management. 3 Credits.

Application and use of software for problem solving, reporting, and graphical communication. 2 lectures. Prereq: CSCI 114 or CSCI 116 or MIS 116. Co-req: MATH 105, MATH 107 or MATH 146.

ASM 264L. Natural Resource Management Systems Laboratory. 1 Credit.

Laboratory to complement concepts introduced in ASM 264. Topics include land survey, maps, rainfall and runoff, erosion control, drainage and irrigation, and costs and returns. Co-req: ASM 264 or NRM 264 or SOIL 264. Prereq: Students must be ASM majors only.

ASM 264. Natural Resource Management Systems. 3 Credits.

General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with NRM 264 and SOIL 264.

ASM 291. Seminar. 1-3 Credits.

ASM 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 294. Individual Study. 1-5 Credits.

ASM 299. Special Topics. 1-5 Credits.

ASM 323. Post-Harvest Technology. 3 Credits.

Principles and management of crop and feed storage, handling, drying, processing, and crop/feed systems siting, planning, and development. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 354. Electricity and Electronic Applications. 3 Credits.

Fundamentals and applications of electricity, power distribution, controls, motors, and solid-state electronics. For non-engineering majors. 2 lectures, 1 three-hour laboratory. Prereq: Junior standing, MATH 103 or MATH 104.

ASM 368. Structures and Environment Systems. 3 Credits.

Study of environmental needs of animals and bioproducts, control of building environments, construction materials, framing systems, and functional planning for biosystem structures. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 373. Tractors & Power Units. 3 Credits.

Theory and principles of operation, use, maintenance, repair, and selection of tractors and power systems. Includes engines, transmissions, fuel, lubrication, hydraulics, traction, and electrical systems. 3 lectures. Prereq: MATH 103 or MATH 104.

ASM 374. Power Units Laboratory. 1 Credit.

Laboratory to complement concepts introduced in ASM 373. Topics include engine systems, operation, adjustment, maintenance, repair, measurement, and testing. 1 three-hour laboratory. Prereq: MATH 103 or 104.

ASM 378. Machinery Principles and Management. 3 Credits.

Principles of agricultural machinery manufacture, sales, operation, and management. Topics include selection, replacement, operation, application, and maintenance. 2 lectures, 1 three-hour laboratory. Prereq: MATH 103 or MATH 104.

ASM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ASM 391. Seminar. 1-3 Credits.**ASM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 394. Individual Study. 1-5 Credits.**ASM 396. Field Experience. 1-15 Credits.****ASM 397. Fe/Coop/Internship. 1-4 Credits.****ASM 399. Special Topics. 1-5 Credits.****ASM 429. Hydraulic Power Principles and Applications. 3 Credits.**

Study of fluid power principles, components, schematics, and systems. Emphasis is on proper use, maintenance, and applications of hydraulic power equipment. Prereq: Junior standing. Co-req: PHYS 211.

ASM 454. Principles and Application of Precision Agriculture. 3 Credits.

Principles and application of precision agriculture including yield monitoring systems, variable rate technology, GIS, GPS, sensors, auto guidance, data acquisition and management, mapping and equipment management. 2 lectures, 1 three-hour laboratory. Prereq: MATH 103, MATH 104, or MATH 107. {Also offered for graduate credit - see ASM 654.}.

ASM 455. Data Management in Precision Agriculture. 3 Credits.

This course demonstrates the importance of data management in precision agriculture including data sources, acquisition, analysis and interpretation. Sources include yield monitoring, imagery, soil and crop sensors and machine performance through telemetry. Storage, display, mapping and data use. 3 lectures. Prereq: MATH 103 or higher. {Also offered for graduate credit - See ASM 655.}.

ASM 468. Landscape Irrigation Design. 2 Credits.

Students will learn the basic issues of water resources, water management, and irrigation system design. 2 lectures. Prereq: Junior standing. Cross-listed with PLSC 468. F (odd years).

ASM 469. Landscape Irrigation Installation and Management. 2 Credits.

Irrigation system installation, winterization, start-up, troubleshooting, renovation, and drainage. 2 lectures. Prereq: Junior standing. Cross-listed with PLSC 469. S (even years).

ASM 475. Management of Agricultural Systems. 2 Credits.

Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. Prereq: Senior standing. {Also offered for graduate credit - see ASM 675.}.

ASM 491. Seminar. 1-5 Credits.**ASM 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ASM 494. Individual Study. 1-5 Credits.**ASM 496. Field Experience. 1-15 Credits.****ASM 499. Special Topics. 1-5 Credits.****ASM 655. Data Management in Precision Agriculture. 3 Credits.**

This course demonstrates the importance of data management in precision agriculture including data sources, acquisition, analysis and interpretation. Sources include yield monitoring, imagery, soil and crop sensors and machine performance through telemetry. Storage, display, mapping and data use. 3 lectures. {Also offered for undergraduate credit - See ASM 455.}.

ASM 675. Management of Agricultural Systems. 2 Credits.

Capstone learning experience involving team solution to problems in agricultural systems management. Oral and written communications are emphasized. 2 lectures. {Also offered for undergraduate credit - see ASM 475.}.

Agriculture General (AGRI)

AGRI 115. Wonders of Weather. 3 Credits.

This class reveals the mystery of the wonders of every-day weather. Through hands-on experimentation, observations, and discussion of day-to-day weather, students curious about weather and its impacts will come to understand the natural forces structuring the Earth's atmosphere and its weather patterns that directly impact lives of all sharing the Mother Earth.

AGRI 150. Agriculture Orientation. 1 Credit.

Introduction to opportunities and professional advancement in agricultural careers. Overview of majors offered in the College of Agriculture, Food Systems, & Natural Resources, activities, and support services.

AGRI 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, BUSN 189, HD&E 189, ME 189 and UNIV 189. F.

AGRI 291. Seminar. 1-3 Credits.

AGRI 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 294. Individual Study. 1-5 Credits.

AGRI 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

AGRI 391. Seminar. 1-3 Credits.

AGRI 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 394. Individual Study. 1-5 Credits.

AGRI 397. Coop/Internship. 1-4 Credits.

AGRI 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

AGRI 496. Field Experience. 1-15 Credits.

AGRI 790. Graduate Seminar. 1-5 Credits.

AGRI 793. Individual Study/Tutorial. 1-5 Credits.

Animal Sciences (ANSC)

ANSC 101. Student Success Techniques - Animal and Equine Science. 1 Credit.

This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the animal and equine science programs, internship & study abroad opportunities, career opportunities, professional communication, as well as student success basics. Prereq: Animal Science and Equine Science majors only.

ANSC 102. Student Success Techniques - Animal Sciences with Pre-Veterinary Medicine Emphasis. 1 Credit.

This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the veterinary school requirements, options within the animal sciences program, professional communication, internship & study abroad opportunities, career opportunities, as well as student success basics. Prereq: Animal Science or Equine Science majors only.

ANSC 114. Introduction to Animal Sciences. 3 Credits.

General principles of the livestock industry and relationships to mankind. 2 lectures, 1 two-hour laboratory.

ANSC 194. Individual Study. 1-5 Credits.**ANSC 196. Field Experience. 1-15 Credits.****ANSC 199. Special Topics. 1-5 Credits.****ANSC 200. Introduction to Anthrozoology. 3 Credits.**

In this course students will be introduced to anthrozoology: the study of the interactions and relationships between humans and non-human animals. In this class we will explore the roles that non-human animals play in human society, considering the benefits that we humans receive and the responsibilities we have toward other species. Research findings involving human-animal interactions will be explored.

ANSC 201. Student Success Techniques - Nontraditional & Transfer Students. 1 Credit.

This course is designed to ease the transition for student new to NDSU. The specific focus of this course will be dependent on the interests and needs of enrolled students. Some of the topics will include: an overview of the animal and equine science programs, internship & study abroad opportunities, career opportunities, professional communication, and student success basics. Prereq: Animal Science or Equine Science majors only.

ANSC 210. Introduction to Therapeutic Horsemanship. 3 Credits.

This course will introduce students to perspectives of disabilities, how equine assisted activities may affect individuals with specific disabilities, how to select appropriate horses and adaptive equipment, and will include discussion on the history and current discipline of therapeutic horsemanship and related fields. F.

ANSC 218. Anatomy and Physiology of Domestic Animals. 3 Credits.

This course is an introduction to the anatomy and physiology of common domestic animals with an emphasis on how the normal structure and functions of the body contribute to health. A systems approach will be used to explore the interactions and complexity of the body.

ANSC 219. Anatomy and Physiology Laboratory. 1 Credit.

This laboratory course complements and reinforces lecture material presented in Anatomy and Physiology of Domestic Animals. It is an introduction to anatomy and physiology of common domestic animals with emphasis on how the normal structures and functions of the body contribute to health.

ANSC 220. Livestock Production. 3 Credits.

General production and management of major meat and dairy animal species. Topics include production systems, feeding, facilities, health, economics, and marketing. 2 lectures, 1 two-hour laboratory.

ANSC 223. Introduction to Animal Nutrition. 2 Credits.

Principles of feeding livestock and pets including digestive systems, nutrient characteristics, nutrient requirements, and feed sources used in formulating balanced rations.

ANSC 230. Meat Grading and Evaluation. 2 Credits.

Evaluation and grading of carcasses and wholesale cuts of beef, pork, and lamb. Written explanation of decisions and comparisons. 2 three-hour laboratories. F.

ANSC 231. Livestock Evaluation. 2 Credits.

The study of evaluating breeding and market livestock based on records, appearance, and soundness. 2 three-hour laboratories. Prereq: ANSC 240. F.

ANSC 232. Dairy Cattle Evaluation. 2 Credits.

Visual appraisal and evaluation of dairy cattle. Type classification of dairy cattle. 2 three-hour laboratories. F.

ANSC 233. Junior Competitive Livestock Evaluation. 2 Credits.

The study of evaluating breeding and market livestock based upon visual appraisal and performance records. The NDSU Junior Livestock Evaluation Team will be selected from students enrolled in ANSC 233. Students are admitted to the course by instructor approval. 2, three-hour laboratories plus hours arranged. Prereq: ANSC 240.

ANSC 235. Equine Evaluation. 2 Credits.

Detailed study of horse conformation, selection criteria, and judging standards for equine competitions. Emphasis will be placed on development of critical thinking, decision making, and oral presentation skills. 2 three-hour laboratories. May be repeated. Prereq: ANSC 260. F.

ANSC 240. Meat Animal Evaluation and Marketing. 3 Credits.

Relationship between live animal composition and meat product values. Introduction to basic muscle biology and effects of livestock practices on meat quality. 2 lectures, 1 two-hour laboratory.

ANSC 241. Survey of Meat Science. 2 Credits.

Introduction to aspects of fresh and processed meat technology. Co-reqs: ANSC 243, ANSC 244, ANSC 245.

ANSC 243. Slaughter and Processing of Domestic Livestock. 4 Credits.

This course will teach the principles and procedures of meat animal humane slaughter, carcass fabrication, and meat processing. You will be required to help in all processes of slaughter, fabricating, processing, and cleaning. Prereq: Students must be in the North Dakota College of Science Meat Processing certificate program. Co-req: ANSC 241, ANSC 244, ANSC 245.

ANSC 244. Value-added Meats Processing. 2 Credits.

An investigation of factors involved in the production of processed and value-added meat products by hands-on training and classroom instruction. Prereq: Students must be enrolled in the North Dakota State College of Science meat processing certificate program. Co-req: ANSC 241, ANSC 243, ANSC 245.

ANSC 245. Hazard Analysis and Critical Control Points. 2 Credits.

Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. Prereq: Student must be enrolled in North Dakota State College of Science meat processing program. Co-req: ANSC 241, ANSC 243, ANSC 244.

ANSC 260. Introduction to Equine Studies. 2 Credits.

Introduction to basic aspects of equine studies and general principles surrounding the horse industry. 2 one-hour lectures. F.

ANSC 260L. Equine Care and Management Practicum. 1 Credit.

A laboratory course designed to supplement lecture material covered in ANSC 260. Students will learn management and husbandry skills relevant to modern horse care practices. 1 two-hour laboratory. F,S.

ANSC 261. Basic Equitation & Horsemanship. 1 Credit.

Basic grooming, saddling, bridling, mounting, ground work, correct riding position, and proper coordination of the riding aids will be addressed. Horse behavior will also be discussed throughout the course. 1 two-hour laboratory. Lab fee required. Enrollment priority will be given to Equine Studies Major/Minor/Certificate students.

ANSC 291. Seminar. 1-5 Credits.**ANSC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 294. Individual Study. 1-5 Credits.**ANSC 296. Field Experience. 1-15 Credits.****ANSC 299. Special Topics. 1-5 Credits.****ANSC 300. Domestic Animal Behavior and Management. 3 Credits.**

Discussion of animal behavior, with an emphasis on physiology, as it relates to management, handling and housing of domestic animals. Basic methods of measuring behavior are explored. Prereq: ANSC 114, VETS 135.

ANSC 310. Principles of Therapeutic Horsemanship Instruction. 3 Credits.

This course is focused on theoretical knowledge and application of therapeutic horsemanship instruction through experiential learning and teaching techniques of peers, and includes evaluation and training techniques for therapy horses, lesson plan development, and critical reviews of the literature. Prereq: ANSC 210, ANSC 261. S.

ANSC 312. Bovine Pregnancy Diagnosis and Ultrasonography. 1 Credit.

The course will involve the anatomy and physiology of the bovine. Utilization of techniques to determine pregnancy and ultrasonography will be instructed. Prereq: ANSC 463.

ANSC 314. Animal Biotechnology. 3 Credits.

Animal biotechnology, biotechnology in human health, biotechnology in reproduction, and biotechniques. Prereq: BIOL 126 or BIOL 150.

ANSC 323. Fundamentals of Nutrition. 3 Credits.

Fundamentals of nutrition emphasizing digestion, metabolism, function, requirements, and sources of specific nutrients. 3 lectures. Recommended Prereq: ANSC 123, BIOC 260. S.

ANSC 324. Applied Animal Nutrition. 3 Credits.

The application of nutrition principles in feed management systems for livestock, poultry, and pets. Prereq: ANSC 323.

ANSC 330. Competitive Meat Grading and Evaluation. 2 Credits.

Senior meat judging team. Team members will travel to intercollegiate meat judging contests. May be repeated. Prereq: ANSC 230.

ANSC 331. Competitive Livestock Evaluation. 2 Credits.

Evaluation of breeding and market livestock with an emphasis on preparing students for judging competition. 3 three-hour laboratories plus additional times to be arranged. May be repeated. Prereq: ANSC 231.

ANSC 332. Competitive Dairy Cattle Evaluation. 2 Credits.

Visual appraisal and evaluation of dairy cattle for competition at national dairy evaluation contests. 2 three-hour laboratories plus time to be arranged. Prereq: ANSC 232 and a minimum cumulative 2.0 GPA. May be repeated for credit.

ANSC 340. Principles of Meat Science. 3 Credits.

Introduction to the anatomical, physiological, developmental, and biochemical aspects conversion of muscle to meat and aspects of fresh and processed meat technology, preservation, microbiology, and current issues. 2 lectures, 1 two-hour laboratory.

ANSC 344. Fundamentals of Meat Processing. 2 Credits.

Chemical and physical relationships in meat preservation, sausage production, and other meat product preparation. 1 lecture, 1 three-hour laboratory.

ANSC 350. Graduate Experience Program. 1 Credit.

This course is designed to give undergraduate students the opportunity to explore graduate studies in the Animal Sciences. Undergraduates are paired with a graduate student mentor and participate in data collection, lab work, departmental seminars, journal article presentations, and scientific meetings.

ANSC 357. Animal Genetics. 3 Credits.

Genetic and statistical principles applied to livestock improvement. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315, STAT 330. S.

ANSC 358. Equine Genetics. 2 Credits.

Genetic principles applied to horses including: genetic improvement programs, genetic defects, color inheritance, inbreeding, domestication and breeds. Prereq: BIOL 315 or PLSC 315. F.

ANSC 360. Equine Nutrition. 3 Credits.

This course focuses on basic equine nutrition fundamentals while integrating concepts in an applied and practical manner. Recommended Prereq: ANSC 223 or ANSC 323.

ANSC 361. Intermediate Horsemanship. 1 Credit.

A continuation of ANSC 261. Further emphasis will be placed on development of the balanced seat and coordinated aids necessary to complete more advanced maneuvers. 1 two-hour laboratory. Lab fee required. Enrollment priority will be given to Equine Studies Major/Minor/Certificate students. Prereq: ANSC 261.

ANSC 362. Colts in Training. 2 Credits.

Principles and application of techniques required to train a young horse to ride. Three two-hour laboratories. Enrollment priority will be given to equine studies major/minor students. Lab fee required. Recommended prereq: ANSC 261, ANSC 361. S.

ANSC 364. Equine Anatomy and Physiology. 3 Credits.

This course focuses on a practical understanding of equine anatomy and physiology as they relate to management, conditioning, and reproduction. Prereq: VETS 135.

ANSC 370. Fundamentals/Animal Disease. 3 Credits.

Basic principles of disease processes and prevention. Comparative review emphasizing infectious and management related diseases in production and companion species. An emphasis will be placed on public health. Prereq: ANSC 218 or BIOL 220. Recommended prereq: ANSC 114 and MICR 202 or MICR 350.

ANSC 371. Fundamentals of Animal Disease II. 3 Credits.

Basic principles of disease processes and prevention. Comparative review emphasizing infectious and management related diseases in domestic animals with a focus on canine, feline and equine species. An emphasis will be placed on public health. Prereq: ANSC 218.

ANSC 375. Methods of Horsemanship Instruction. 2 Credits.

In this experiential learning course, students will study methods of instruction, lesson plan development, and demonstrate integration of their knowledge through practical teaching situations, both mounted and unmounted. Prereq: ANSC 361. F (even years).

ANSC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ANSC 380. Livestock Sales and Marketing. 2 Credits.

Students will learn the importance of livestock marketing, catalog development, livestock photography, sale advertising, and animal management, and will hold a sale at the end of the semester. Prereq: Junior or Senior standing.

ANSC 380L. Livestock Sales and Marketing Laboratory. 1 Credit.

Students will learn the importance of livestock marketing by utilizing livestock selection and evaluation, catalog development, livestock photography, sale advertising, and animal management. Furthermore students will build a customer database, prepare sale advertisements and announcements using various forms of communication such as written and electronic. Students will manage numerous social media platforms. At the end of the semester, students will manage and conduct a livestock auction. Prereq: Junior or Senior standing. Co-req: ANSC 380.

ANSC 391. Seminar. 1-5 Credits.**ANSC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 393. Undergraduate Research. 1-5 Credits.

ANSC 394. Individual Study. 1-5 Credits.

ANSC 396. Field Experience. 1-15 Credits.

ANSC 397. Fe/Coop Ed/Internship. 1-15 Credits.

ANSC 399. Special Topics. 1-5 Credits.

ANSC 410. Therapeutic Horsemanship Teaching Practicum. 1 Credit.

In this practical teaching course, students will team teach for 6 to 12 weeks with a North American Riding for the Handicapped Association (NARHA) certified instructor at a local therapeutic program, assisting with lesson plan and program plan development, mounting and dismounting of riders, as well as instruction and evaluation of riders. Prereq: ANSC 210, ANSC 310.

ANSC 426. Feed Technology. 2 Credits.

This course is a comprehensive introduction to feed production technology; the science of feeds, feeding, feed additives and feed optimization; and management and legal aspects in providing quality livestock, poultry, aquatic and companion animal feeds. Prereq: ANSC 223 or ANSC 324 or ANSC 360.

ANSC 440. Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems. 2 Credits.

Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. {Also offered for graduate credit - see ANSC 640.}.

ANSC 444. Livestock Muscle Physiology. 3 Credits.

Basic concepts in muscle growth and development of livestock, evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism and physiology, and how this ultimately affects the nature of muscle as food. Prereq: CHEM 260. {Also offered for graduate credit - see ANSC 644.}.

ANSC 457. Genetic Improvement of Livestock. 3 Credits.

Principles and applications of technologies for the genetic improvement of livestock including both quantitative and molecular techniques. Prereq: ANSC 357.

ANSC 458. Evaluation and Use of Breeds of Livestock. 3 Credits.

Evaluation of breeds of cattle, sheep and swine with emphasis of breed comparison research and breed history. Examination of appropriate use of existing breed resources and development of new breeds. Prereq: ANSC 357. {Also offered for graduate credit - see ANSC 658.}.

ANSC 461. Advanced Horsemanship and Equitation. 1 Credit.

Advanced emphasis on horsemanship techniques to develop the finished rider. 1 two-hour laboratory. Lab fee. Prereq: ANSC 361.

ANSC 463L. Physiology of Reproduction Laboratory. 1 Credit.

Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. Prereq: ANSC 463. {Also offered for graduate credit - see 663L.}.

ANSC 463. Physiology of Reproduction. 3 Credits.

Comparative anatomy, physiology, and endocrinology of reproduction in mammals. {Also offered for graduate credit - see ANSC 663.}.

ANSC 478. Research and Issues in Animal Agriculture. 3 Credits.

Examination of the role of animal agriculture in society, research pertaining to the animal sciences and current issues facing animal agriculture.

Prereq: Senior standing with a primary interest in animal agriculture.

ANSC 480. Equine Industry and Production Systems. 3 Credits.

A capstone course that incorporates genetics, nutrition, exercise physiology, reproduction, health care, and industry practices into management of the equine enterprise. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 360, ANSC 364. F.

ANSC 482. Sheep Industry and Production Systems. 3 Credits.

A capstone course that incorporates genetics, nutrition, reproduction, disease control, and marketing into sustainable flock enterprises. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357 and ANSC 463.

ANSC 484. Swine Production/Pork Industry Systems. 3 Credits.

Capstone course includes breeding systems, disease control, applied economics, housing, marketing, pork quality, and nutrition in a systems approach. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357, ANSC 463.

ANSC 485. Poultry Industry and Production Systems. 3 Credits.

A capstone course that includes production, management, and marketing of the U.S. poultry industry. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357, ANSC 463.

ANSC 486. Beef Industry and Production Systems. 3 Credits.

Capstone course includes the management, systems, selection, record keeping, merchandising, and production testing of beef. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 357 and ANSC 463.

ANSC 487. Growing and Finishing Cattle Management. 3 Credits.

Integrated management of cattle fed for slaughter with emphasis on nutrition, health, marketing, and risk management; covers the beef enterprise from weaning to market. Prereq: Junior or Senior standing. {Also offered for graduate credit - see ANSC 687 .}.

ANSC 488. Dairy Industry and Production Systems. 3 Credits.

Capstone course: United States dairy industry including terminology, dairy stock management, economics and finance, facilities, waste management, nutrition, milk quality and animal health. 2 lectures, 1 two-hour laboratory. Prereq: ANSC 324, ANSC 463.

ANSC 491. Seminar. 1-5 Credits.**ANSC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANSC 494. Individual Study. 1-5 Credits.**ANSC 496. Field Experience. 1-15 Credits.****ANSC 499. Special Topics. 1-5 Credits.****ANSC 640. Hazard Analysis Critical Control Point (HACCP) and Food Safety Systems. 2 Credits.**

Students will become familiar with hazard analysis, critical control point and food safety plans, including good manufacturing practices and standard operating procedures for safe food production. {Also offered for undergraduate credit - see ANSC 440.}.

ANSC 644. Livestock Muscle Physiology. 3 Credits.

Basic concepts in muscle growth and development of livestock, evaluating the effects of environment, welfare, nutrition and genetics regarding muscle metabolism and physiology, and how this ultimately affects the nature of muscle as food. {Also offered for undergraduate credit - see ANSC 444.}.

ANSC 657. Genetic Improvement of Livestock. 3 Credits.

Principles and applications of technologies for the genetic improvement of livestock including both quantitative and molecular techniques. {Also offered for undergraduate credit - see ANSC 457.}.

ANSC 658. Evaluation and Use of Breeds of Livestock. 3 Credits.

Evaluation of breeds of cattle, sheep and swine with emphasis of breed comparison research and breed history. Examination of appropriate use of existing breed resources and development of new breeds. {Also offered for undergraduate credit - see ANSC 458.}.

ANSC 663. Physiology of Reproduction. 3 Credits.

Comparative anatomy, physiology, and endocrinology of reproduction in mammals. {Also offered for undergraduate credit - see ANSC 463.}.

ANSC 663L. Physiology of Reproduction Laboratory. 1 Credit.

Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. {Also offered for undergraduate credit - see ANSC 443L.}.

ANSC 687. Growing and Finishing Cattle Management. 3 Credits.

Integrated management of cattle fed for slaughter with emphasis on nutrition, health, marketing, and risk management; covers the beef enterprise from weaning to market. {Also offered for undergraduate credit - see ANSC 487.}.

ANSC 690. Graduate Seminar. 1-5 Credits.**ANSC 695. Field Experience. 1-15 Credits.****ANSC 696. Special Topics. 1-5 Credits.****ANSC 701. Writing and Communicating in the Animal Sciences. 3 Credits.**

Studying and practicing scientific writing and communication in the animal science discipline.

ANSC 725. Advanced Equine Nutrition. 3 Credits.

This course explores concepts in equine nutrition including digestive physiology of horses, nutrient requirements for different classes of horses and feed management. Ration evaluation and balancing, as well as problem solving will be a core component to this course. Prereq: ANSC 776.

ANSC 740. Data Analyses and Designs of Experiments. 3 Credits.

Experimental design principles, introductory statistical theory, and commonly used data analyses of animal science data are taught and practiced with practical applications using the computer. 3 lectures. Prereq: STAT 725.

ANSC 750. Quantitative Genetics Applications of Matrix Algebra. 1 Credit.

Principles in matrix algebra to describe and solve problems in the agricultural and life sciences, and particularly quantitative genetics. Material includes vocabulary, concepts, and, to a lesser extent, theory of matrix algebra, with application to ecological systems, genotypic transition matrices, selection indices, and the numerator relationship matrix. With matrix algebra, use least squares procedures and canonical transformation to solve problems in biological sciences.

ANSC 751. A Primer to Quantitative Genetics. 1 Credit.

Language and foundational principles of quantitative genetics. Material includes basic model for quantitative genetics (additive and non-additive genetic effects, including Mendelian sampling, and environmental effects), sources of variation, heritability, family resemblance and repeatability, selection response, and family selection. Define expected values and concepts in applied statistics. Prereq: ANSC 750.

ANSC 752. Selection Index Theory and Application. 1 Credit.

Theory and application of selection indices. Material includes design of animal breeding programs, estimating selection response, constructing economic selection indices, and developing multiple-stage selection strategies. Introduces approaches for deriving economic weights, and predicting economic response to selection. Prereq or Co-req: ANSC 751.

ANSC 753. Economic Breeding Programs. 1 Credit.

Principles for developing an economic basis for multiple-trait selection to improve the profitability of production. Material includes review of concepts relevant to the selection index, introduction to the concept of systems analysis, linear programming, and simulation with emphasis on economic values useful for selection index. Critically analyze relevant literature. Prereq or Co-req: ANSC 752.

ANSC 754. CyberSheep: A Genetic Simulation Game. 1 Credit.

Principles of genetic selection and mating strategies applied in livestock breeding programs. Through use of a web-based genetic simulation game (CyberSheep), develop skills in implementing a virtual animal breeding program, assess the outcomes of decision-making in terms of genetic response, inbreeding, and economic returns, and experience stochastic elements inherent to livestock systems.

ANSC 755. Advanced Meat Science. 3 Credits.

An in-depth investigation of the physical and biochemical characteristics of muscle and meat. Students will gain an understanding of advanced meat science topics, and improve their ability to design, conduct, interpret and report meat science research. (even years).

ANSC 756. History and Perspectives in Animal Breeding. 1 Credit.

Historical perspective to the discipline of animal breeding and genetics. Introduction to the contributions of geneticists who have significantly impacted the discipline. Material includes pre-recorded interviews of scientists that have had an international impact in animal breeding and genetics. Critique key papers.

ANSC 758. Molecular Biological Techniques in Animal Sciences. 3 Credits.

The theory and application of molecular biology laboratory techniques to the field of animal sciences.

ANSC 759. Application of Quantitative Genetics in R Software. 1 Credit.

Introduction and application of R software for basic and intermediate tasks in quantitative genetic analyses. Prereq: ANSC 752 Selection Index Theory and Application, which is offered through the Great Plains IDEA Quantitative Genetics and Genomics program, or equivalent.

ANSC 773. Energy Metabolism. 3 Credits.

Methods of measuring energy values and the metabolic processes involved in the production of useful biological energy from organic compounds. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 774. Nitrogen Metabolism. 3 Credits.

Detailed overview of nitrogenous compounds including metabolism and function. Considerable emphasis on current research from the literature. 3 lectures. Prereq: BIOC 701. S (even years).

ANSC 776. Digestive Physiology. 3 Credits.

Investigation of digestive and absorptive events occurring within farm animals. Emphasis on enzyme action, nutrient transport, gut motility, gastrointestinal endocrinology, and current research. 3 lectures. Prereq: BIOC 701. F (odd years).

ANSC 790. Graduate Seminar. 1-5 Credits.**ANSC 791. Temporary/Trial Topics. 1-5 Credits.****ANSC 792. Graduate Teaching Experience. 1-6 Credits.****ANSC 793. Individual Study/Tutorial. 1-5 Credits.****ANSC 795. Field Experience. 1-15 Credits.****ANSC 796. Special Topics. 1-5 Credits.****ANSC 797. Master's Paper. 1-3 Credits.****ANSC 798. Master's Thesis. 1-10 Credits.****ANSC 813. Domestic Animal Endocrinology. 3 Credits.**

Detailed overview of the function of hormones and their effects on physiological systems. Considerable emphasis will be placed on experimental approaches, approaches to manipulate endocrine status, and current literature.

ANSC 828. Advanced Reproductive Biology. 3 Credits.

Discussion of reproductive physiology research with emphasis on current topics in cellular and molecular biology. 3 lectures. S (odd years).

ANSC 830. Growth Biology. 3 Credits.

Regulation of growth at the cell/tissue, organ systems, and whole animal levels. 3 lectures. S (even years).

ANSC 850. Linear Models in Animal Breeding. 1 Credit.

Principles of linear models used in animal breeding. Models discussed in the context of the random variable that is to be predicted. Material includes animal models, sire/maternal grandsire models, and sire models, models with a single and repeated records, and models with both direct and maternal effects. Prereq: ANSC 751, ANSC 752.

ANSC 851. Genetic Prediction. 1 Credit.

Principles for using best linear unbiased prediction (BLUP) in genetic prediction. Material includes data integrity diagnosis, contemporary grouping strategies, adjusting for known non-genetic effects, the AWK Programming Language, UNIX/Linux scripting, and use of modern computational tools to perform genetic evaluations. Emphasis on real-world datasets designed to develop applied analytical skills in animal breeding. Prereq: ANSC 752, ANSC 850.

ANSC 852. Applied Variance Component Estimation. 1 Credit.

Principles in the estimation of (co)variance components and genetic parameters required to solve mixed models typical in livestock genetics. Focus on applied knowledge of approaches used to estimate the G and R sub-matrices of the mixed model equations. Demonstrate models commonly used in parameter estimation. Introduce scientific literature concerning implementation, and attributes of the solutions, of variance component estimation strategies. Prereq: ANSC 850, ANSC 851.

ANSC 856. Prediction and Control of Inbreeding in Breeding Programs. 1 Credit.

Principles in the prediction and control of inbreeding in livestock breeding program. Material includes definition of inbreeding and identity by descent, impacts of inbreeding on genotype frequencies, trait means and variances, random drift, computation of inbreeding coefficients in pedigreed populations, prediction of rates of inbreeding in closed populations, and control and management of inbreeding in breeding populations. Prereq: ANSC 751.

ANSC 875. Vitamins and Minerals. 3 Credits.

Metabolism of vitamins and minerals and their application in animal nutrition and the feed industry. 3 lectures. Prereq: BIOC 701. F (even years).

ANSC 892. Graduate Teaching Experience. 1-6 Credits.**ANSC 899. Doctoral Dissertation. 1-15 Credits.**

Anthropology (ANTH)

ANTH 111. Introduction to Anthropology. 3 Credits.

Introductory overview to anthropology, the holistic study of humans and the diversity of the human experience over space and time. Covers the major fields of anthropology: cultural and biological anthropology, archaeology, linguistics, applied anthropology.

ANTH 194. Individual Study. 1-3 Credits.**ANTH 196. Field Experience. 1-15 Credits.****ANTH 199. Special Topics. 1-5 Credits.****ANTH 204. Archaeology and Prehistory. 3 Credits.**

Introduction to archaeological methods, followed by a survey of world prehistory.

ANTH 205. Human Origins. 3 Credits.

Examination of the evolution of humans through the investigation of fundamental principles of evolution, human variation, comparative primate behavior, and the fossil record.

ANTH 206. Introduction to Cultural Anthropology: Peoples of the World. 3 Credits.

Core concepts, theories, and practices in cultural anthropology and anthropological knowledge application in a globalizing world. Through rich, engaging ethnographic texts and case studies, focuses on selected societies and culture change in deep sociohistorical contexts.

ANTH 209. Introduction to Linguistics. 3 Credits.

Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ENGL 209.

ANTH 291. Seminar. 1-3 Credits.**ANTH 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 294. Individual Study. 1-5 Credits.**ANTH 299. Special Topics. 1-5 Credits.****ANTH 332. Medical Anthropology. 3 Credits.**

Examines cultural conceptions, beliefs, and practices regarding health, illness, disease, and treatment through a cross-cultural and historical perspective. The course includes theoretical, methodological, and case study perspectives from physical anthropology, archaeology, and cultural anthropology.

ANTH 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ANTH 391. Seminar. 1-3 Credits.**ANTH 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 394. Individual Study. 1-5 Credits.**ANTH 399. Special Topics. 1-5 Credits.****ANTH 438. Historical Archaeology. 3 Credits.**

Examines the development, methods, and research themes of historical archaeology. {Also offered for graduate credit - See ANTH 638.}.

ANTH 441. Death and Dying. 3 Credits.

Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with SOC 441. {Also offered for graduate credit - see ANTH 641.}.

ANTH 442. Feminist Anthropology. 3 Credits.

Explores the methodologies, theoretical frameworks, and activism that shapes feminist anthropological research. Feminist anthropology has helped to expand the scope of the field and has encouraged scholars to be more inclusive, critical, and engaged. {Also available for graduate credit - See ANTH 642.}.

ANTH 445. Archaeology of Native North America. 3 Credits.

This course introduces students to the archaeology of Indigenous North America from initial human colonization to the onset of the global era. The course provides students with a firm foundation in major themes in the development and diversity of Indigenous cultures in North America, as well as an introduction to key sites and archaeological remains that document these societies. Regions covered include the Great Plains, Eastern Woodlands, Southwest, and Pacific Coast. Topical coverage includes earliest inhabitants, hunter-fisher-gatherer lifeways, the origins of agriculture, mound-building and ritual landscapes, long-distance trade, death and burial, the development of village-based societies, social complexity, and early European colonialism. {Also offered for graduate credit - see ANTH 645.}.

ANTH 446. Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity. 3 Credits.

Exploration of Latin America and the Caribbean's diverse societies historically and culturally; focus on gender, indigenous groups, and Afro-Latin Americans. Includes case studies covering social justice movements, political and economic processes, indigenous rights, religion. Prereq: ANTH 206. {Also offered for graduate credit - see ANTH 646.}.

ANTH 453. Magic and Religion. 3 Credits.

Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: ANTH 111. Cross-listed with RELS 453. {Also offered for graduate credit - see ANTH 653.}.

ANTH 455. Language and Expressive Culture. 3 Credits.

Examines sociolinguistic and semiotic theories and analysis methods for discourse-centered approaches to communicative culture. Explores the ways in which humans construct and express meaning through written/spoken language, song, folklore, ritual, performance, images, clothing, and food. Prereq: ANTH 111 and at least junior standing. {Also offered for graduate credit - see ANTH 655.}.

ANTH 458. Indigenous Peoples and Cultures of the Upper Midwest. 3 Credits.

This interdisciplinary seminar introduces students to the rich history and culture of the Indigenous peoples of the Upper Midwest. {Also offered for graduate credit - see ANTH 658.}.

ANTH 462. Anthropology and the Environment. 3 Credits.

The environment as understood through anthropological research. Focus on ethnographic texts confronting global environmental issues through specific context (place, cultural, historical) and human-environment interactions as shaped by political, economic, and social relations. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 662.}.

ANTH 464. Disaster and Culture. 3 Credits.

Examines human-made and natural disasters through cross-cultural and historical perspectives. Addresses cultural variation across and within relevant communities including those of disaster victims, emergency management systems, and a broad public. Prereq: Junior or Senior standing. {Also offered for graduate credit - see ANTH 664.}.

ANTH 470. Theory in Archaeology. 3 Credits.

Theory doesn't always get the best rap. It has a reputation for being dry and distanced from the 'real world'. But theory isn't something we can do without. Any statement about what happened in the past depends on theory. Even apparently trivial activities like drawing a stratigraphic profile or cataloguing artifacts rely on theoretical concepts, though these are often taken for granted. This is because theory is how we make sense of the world. It provides a framework for understanding, a basis for asking new questions, and a guide for how data should be collected and arranged. Because theory isn't optional, it needs to be critically and carefully thought out. In this course, we'll do just that by examining in detail how theory (a) helps us to define what archaeology as a field consists of, (b) provides a vision of human culture, social relations, and long-term change, and, (c) determines appropriate methods for excavating and interpreting archaeological remains. May be repeated. Prereq: ANTH 204. {Also offered for graduate credit - see ANTH 670.}.

ANTH 471. Archaeological Research Methods. 3 Credits.

Overview of the most often used or potentially useful archaeological methods and their applications in fieldwork, laboratory processing, and specialized analytical techniques. Focus on problem-solving skills through the application of different archaeological methods. Prereq: ANTH 204. {Also offered for graduate credit - see ANTH 671.}.

ANTH 479. Community-Based and Indigenous Archaeologies. 3 Credits.

Over the last three decades, archaeologists as scholars and practitioners have been challenged to become more accountable to, engaged with, and inclusive of, multiple publics, especially descendant and Indigenous communities. This has given rise to various forms of archaeological practice that cluster around ideas of ethical engagement, social justice, activism, decolonization, and Indigenous rights. In this senior seminar, students will explore the developing fields of Community-Based and Indigenous archaeologies from a wide variety of perspectives. {Also available for graduate credit - See ANTH 679.}.

ANTH 480. Development of Anthropological Theory. 3 Credits.

Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 680.}.

ANTH 481. Ethnographic Research Methods. 3 Credits.

Focuses on qualitative research methods, with an emphasis on ethnographic methods used in cultural anthropology and sociology. Instruction in the theoretical orientations and ethics underlying immersive participant-observation fieldwork, and application of its central practices, including key informant and in-depth interviews, document and photo collection, journaling and reflective memos, and qualitative data analysis. Prereq: ANTH 206 and junior or senior standing. {Also offered for graduate credit - see ANTH 681.}.

ANTH 489. Senior Capstone In Anthropology. 1 Credit.

Synthesis of social research methods, anthropological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: Senior standing.

ANTH 491. Seminar. 1-5 Credits.**ANTH 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ANTH 493. Undergraduate Research. 1-5 Credits.**ANTH 494. Individual Study. 1-5 Credits.****ANTH 496. Field Experience. 1-15 Credits.****ANTH 499. Special Topics. 1-5 Credits.****ANTH 638. Historical Archeology. 3 Credits.**

Examines the development, methods, and research themes of historical archaeology. Cross-listed with HIST. {Also offered for undergraduate credit - See ANTH 438.}.

ANTH 641. Death and Dying. 3 Credits.

Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with SOC 641. {Also offered for undergraduate credit - see ANTH 441.}.

ANTH 642. Feminist Anthropology. 3 Credits.

Explores the methodologies, theoretical frameworks, and activism that shapes feminist anthropological research. Feminist anthropology has helped to expand the scope of the field and has encouraged scholars to be more inclusive, critical, and engaged. {Also available for undergraduate credit - See ANTH 442.}.

ANTH 645. Archaeology of Native North America. 3 Credits.

This course introduces students to the archaeology of Indigenous North America from initial human colonization to the onset of the global era. The course provides students with a firm foundation in major themes in the development and diversity of Indigenous cultures in North America, as well as an introduction to key sites and archaeological remains that document these societies. Regions covered include the Great Plains, Eastern Woodlands, Southwest, and Pacific Coast. Topical coverage includes earliest inhabitants, hunter-fisher-gatherer lifeways, the origins of agriculture, mound-building and ritual landscapes, long-distance trade, death and burial, the development of village-based societies, social complexity, and early European colonialism. {Also offered for undergraduate credit - see ANTH 445.}.

ANTH 646. Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity. 3 Credits.

Exploration of Latin America and the Caribbean's diverse societies historically and culturally; focus on gender, indigenous groups, and Afro-Latin Americans. Includes case studies covering social justice movements, political and economic processes, indigenous rights, religion. {Also offered for undergraduate credit - see ANTH 446.}.

ANTH 653. Magic and Religion. 3 Credits.

Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. {Also offered for undergraduate credit - see ANTH 453.}.

ANTH 655. Language and Expressive Culture. 3 Credits.

Examines sociolinguistic and semiotic theories and analysis methods for discourse-centered approaches to communicative culture. Explores the ways in which humans construct and express meaning through written/spoken language, song, folklore, ritual, performance, images, clothing, and food. {Also offered for undergraduate credit - see ANTH 455.}.

ANTH 658. Indigenous Peoples and Cultures of the Upper Midwest. 3 Credits.

This interdisciplinary seminar introduces students to the rich history and culture of the Indigenous peoples of the Upper Midwest. {Also offered for undergraduate credit - see ANTH 458.}.

ANTH 662. Anthropology and the Environment. 3 Credits.

The environment as understood through anthropological research. Focus on ethnographic texts confronting global environmental issues through specific context (place, cultural, historical) and human-environment interactions as shaped by political, economic, and social relations. {Also offered for undergraduate credit - see ANTH 462.}.

ANTH 664. Disaster and Culture. 3 Credits.

Examines human-made and natural disasters through cross-cultural and historical perspectives. Addresses cultural variation across and within relevant communities including those of disaster victims, emergency management systems, and a broad public. Prereq: Junior or Senior standing. {Also offered for undergraduate credit - see ANTH 464.}.

ANTH 670. Theory in Archaeology. 3 Credits.

Theory doesn't always get the best rap. It has a reputation for being dry and distanced from the 'real world'. But theory isn't something we can do without. Any statement about what happened in the past depends on theory. Even apparently trivial activities like drawing a stratigraphic profile or cataloguing artifacts rely on theoretical concepts, though these are often taken for granted. This is because theory is how we make sense of the world. It provides a framework for understanding, a basis for asking new questions, and a guide for how data should be collected and arranged. Because theory isn't optional, it needs to be critically and carefully thought out. In this course, we'll do just that by examining in detail how theory (a) helps us to define what archaeology as a field consists of, (b) provides a vision of human culture, social relations, and long-term change, and, (c) determines appropriate methods for excavating and interpreting archaeological remains. May be repeated. {Also offered for undergraduate credit - see ANTH 470.}.

ANTH 671. Archaeological Research Methods. 3 Credits.

Overview of the most often used or potentially useful archaeological methods and their applications in fieldwork, laboratory processing, and specialized analytical techniques. Focus on problem-solving skills through the application of different archaeological methods. {Also offered for undergraduate credit - see ANTH 471.}.

ANTH 679. Community-Based and Indigenous Archaeologies. 3 Credits.

Over the last three decades, archaeologists as scholars and practitioners have been challenged to become more accountable to, engaged with, and inclusive of, multiple publics, especially descendant and Indigenous communities. This has given rise to various forms of archaeological practice that cluster around ideas of ethical engagement, social justice, activism, decolonization, and Indigenous rights. In this senior seminar, students will explore the developing fields of Community-Based and Indigenous archaeologies from a wide variety of perspectives. {Also available for undergraduate credit - See ANTH 479.}.

ANTH 680. Development of Anthropological Theory. 3 Credits.

Focus on major theoretical orientations in anthropology. Emphasis on the ways in which anthropological theories are used to generate explanations for multicultural phenomena. {Also offered for undergraduate credit - see ANTH 480.}.

ANTH 681. Ethnographic Research Methods. 3 Credits.

Focuses on qualitative research methods, with an emphasis on ethnographic methods used in cultural anthropology and sociology. Instruction in the theoretical orientations and ethics underlying immersive participant-observation fieldwork, and application of its central practices, including key informant and in-depth interviews, document and photo collection, journaling and reflective memos, and qualitative data analysis. {Also offered for undergraduate credit - see ANTH 481.}.

ANTH 690. Graduate Seminar. 1-3 Credits.**ANTH 695. Field Experience. 1-15 Credits.****ANTH 696. Special Topics. 1-5 Credits.****ANTH 790. Graduate Seminar. 1-5 Credits.****ANTH 793. Individual Study/Tutorial. 1-5 Credits.****ANTH 794. Practicum/Internship. 1-8 Credits.****ANTH 795. Field Experience. 1-15 Credits.****ANTH 797. Master's Paper. 1-3 Credits.****ANTH 798. Master's Thesis. 1-10 Credits.**

Apparel, Design & Hospitality Management (ADHM)

ADHM 101. Beginning Apparel Construction. 3 Credits.

Introduction to basic apparel assembly methods and use of a sewing machine.

ADHM 140. Introduction to the Hospitality Industry. 3 Credits.

Overview of the hospitality industry; its history, components, career opportunities, development, and future trends with application to food service, lodging, and travel. 3 lectures. F.

ADHM 141. Tourism and International Travel Management. 3 Credits.

Application of management principles and theories to tourism with emphasis on tourism components, recreational activities, international travel, and social, economic, and environmental impacts of the global tourism industry. This course provides fundamental knowledge of tourism impacts, global events and trends, destination management, tourist behaviors, and tourism marketing.

ADHM 151. Design Fundamentals. 3 Credits.

Study and application of elements and principles of design; two- and three-dimensional applications. Co-req: ADHM 152, ADHM 160, ADHM 161 and students must be Interior Design majors.

ADHM 152. Visual Communication I. 1 Credit.

Principles and methods of drawing and sketching, with an emphasis on graphic design, branding, presentation materials, and media. Prereq: Interior Design Major. Co-req: ADHM 151, ADHM 160, ADHM 161.

ADHM 155. Apparel Construction and Fit. 3 Credits.

Principles of apparel construction and analysis. Construction of a fitting sloper and two fashion garments. Prereq: ADHM 101. F.

ADHM 160. Interior Design Careers. 1 Credit.

Survey of the interior design profession and the relationship to allied professionals and organizations. Prereq: Interior Design or Apparel, Retail Merchandising and Design major. F.

ADHM 161. Introduction to Manual Drafting. 3 Credits.

Fundamentals of building construction, materials, and methods. Technical and graphic communication for interior design documentation, with an emphasis placed on lettering and manual drafting. Prereq: Interior Design majors and minors or Apparel, Retail Merchandising and Design majors. Co-req: ADHM 151, ADHM 152 and ADHM 160.

ADHM 171. Fashion Dynamics. 3 Credits.

Introductory course tracing the development of fashion and its industry that includes consumer demand and fashion change, the development, production, and marketing of goods from concept to consumer, and their interrelationships. F.

ADHM 181. Aesthetics and Visual Analysis of Apparel Products. 3 Credits.

Analysis of aesthetics and design principles and their application to apparel and textiles products, environment and oneself.

ADHM 194. Individual Study. 1-3 Credits.

ADHM 196. Field Experience. 1-15 Credits.

ADHM 199. Special Topics. 1-5 Credits.

ADHM 241. Hospitality Accounting. 3 Credits.

Basic financial hospitality accounting concepts and practices. Interpretation of accounting and financial control systems in management decision making; uniform system of accounts, departmentalized costing procedures; ratio analysis; budgeting, financial statement analysis and interpretation. Prereq: ACCT 102, ADHM 140, ADHM 141. F.

ADHM 251. Interior Design Studio I-Residential. 3 Credits.

Introduction of design theory and process to analyze interior environments. Emphasis on programming and space planning. Prereq: ADHM 261 and ADHM 365 with a grade of C or higher. Co-req: ADHM 264 and Interior Design major with a minimum of 3.00 cumulative GPA, or Apparel, Retail Merchandising and Design major (Retail Merchandising Option; Interior Merchandising Focus) or Interior Design Minor.

ADHM 253. Interior Design Studio II-Small Scale Contract. 3 Credits.

Application of design theory and process to analyze small contract environments. Emphasis on programming, schematics, design development, human factors, and construction documentation of commercial environments. Prereq: Interior Design major with a minimum of 3.00 cumulative GPA, ADHM 251 and ADHM 264 with a grade of C or higher. Co-req: ADHM 363 and ADHM 368.

ADHM 261. Visual Communications II. 3 Credits.

Principles and methods of drawing and sketching, including perspective, with an emphasis on a variety of rendering techniques and media. Prereq: ADHM 151, ADHM 152, ADHM 160, ADHM 161 all with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0 or interior design minors. Co-req: ADHM 365.

ADHM 264. Residential Systems. 2 Credits.

Introduction of basic principles of lighting design and interior systems in residential applications. Prereq: ADHM 261 and ADHM 365 both with a grade of C or higher and Interior Design majors with a minimum cumulative 3.0 GPA or Apparel, Retail Merchandising and Design majors. Coreq: ADHM 251.

ADHM 271. Visual Merchandising and Promotion. 3 Credits.

Principles, procedures and sources of information essential for marketing and promoting retail merchandise sales. Experience in planning, executing and evaluating promotion plans. S.

ADHM 272. Product Development. 3 Credits.

Examination of issues and management strategies necessary to produce a competitively priced product. Understanding the role of technology in design, production, and marketing/sales of products. Prereq: ADHM 171, ADHM 181.

ADHM 280. Technology Applications for the Apparel Industry. 3 Credits.

Introduction to the basic digital techniques of Adobe Creative Suite to develop presentation skills necessary in textile and apparel industries.

ADHM 291. Seminar. 1-3 Credits.**ADHM 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 294. Individual Study. 1-5 Credits.**ADHM 299. Special Topics. 1-5 Credits.****ADHM 301. Foundation of Event Management. 3 Credits.**

This course explores the multidisciplinary nature of events management and provides the student with professional knowledge they need in order to succeed in the events industry.

ADHM 310. History of Fashion. 3 Credits.

Historic view of the evolution of fashion in the Western world through time as it relates to political/sociological/economic change. F.

ADHM 315. History of Interiors I. 3 Credits.

Survey of historical interiors and furnishings beginning with antiquity through the 1800's. F.

ADHM 316. History of Interiors II. 3 Credits.

Survey of historical and contemporary interiors and furnishings beginning with the 1800's to the present day. S.

ADHM 351. Interior Design Studio III-Advanced Residential. 3 Credits.

Application of design components to an advanced residential project with emphasis on special populations and design focus. Prereq: Interior Design major with a minimum cumulative 3.0 GPA, ADHM 253, ADHM 363 and ADHM 368 with a grade of C or higher. Coreq: ADHM 460 and ADHM 461.

ADHM 353. Interior Design Studio IV-Large Scale Contract Design. 3 Credits.

Application of design theory and process to large-scale contract environments. Emphasis on wellness in design. Application of laws, codes, standards, and building systems influencing human experience in the interior environment. Prereq: ADHM 351, ADHM 460, ADHM 461 with a grade of C or higher in all prereq courses and students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ADHM 360. Lodging Operations Management. 3 Credits.

This course examines the development of the lodging industry and current trends. Organization and administration of lodging operations including front desk, housekeeping, laundry, sales/marketing, management, and other positions common to lodging operations. Prereq or Co-Req: ADHM 140, ADHM 141. S.

ADHM 363. Commercial Lighting Design and Building Systems. 3 Credits.

Integration of theory, techniques, and the art of lighting design with emphasis on commercial applications. Analysis of commercial building systems. Prereq: ADHM 251 and ADHM 264 both with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Coreq: ADHM 253 and ADHM 368.

ADHM 365. CADD for Interiors. 3 Credits.

Computer-aided design and drafting, emphasizing applications in interior design. Includes drawing creation, editing layers, blocks, and attributes. Co-req: ADHM 261. Prereq: ADHM 151, ADHM 152, ADHM 160, ADHM 161 all with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ADHM 366. Textiles. 3 Credits.

Fibers, yarns, fabric construction, finishes, and dyestuffs related to selection, use, and maintenance of textile products. Coreq: ADHM 367. F.

ADHM 367. Textiles Laboratory. 1 Credit.

Textile product characterization through the analysis of yarn type, fabric, construction, finishes, and dyestuffs; care procedures; simple identification of fibers, yarns, and fabrics. Coreq: ADHM 366. F.

ADHM 368. Interior Materials. 4 Credits.

This course examines the characteristics, applications, specifications and sustainability of materials used in interior spaces. The lab portion focuses on management of resources used by interior designers, including references, product information, and material samples.

ADHM 370. Sewn-Product Manufacturing and Analysis. 3 Credits.

Analysis of the sewn-product manufacturing processes, governmental regulations, sourcing, and technology applications. Focus on evaluating products, quality, performance, and cost. Prereq: ADHM 366, ADHM 367 or departmental approval. S.

ADHM 371. Fashion Trend Analysis and Forecasting. 3 Credits.

Study of techniques and processes of identifying past and present trends and methods for forecasting future trends, with applications in the apparel and home fashion, textiles and retail industries. Prereq: ADHM 181 and ADHM 280.

ADHM 372. Global Retailing. 3 Credits.

Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. Prereq: 2.5 cumulative GPA, junior standing and MRKT 320 or ADHM 171. Cross-listed with MRKT 372.

ADHM 375. Professional Development. 1 Credit.

Internship and career planning including professional expectations and responsibilities. Skills gained in resume and portfolio development, writing cover letters, interviewing techniques, and business etiquette. Prereq: at least junior standing.

ADHM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ADHM 381. Hospitality Marketing and Sales. 3 Credits.

Basic marketing theory and contemporary practice as adapted to the hospitality industry. Emphasis on consumer behavior, market opportunities, marketing research and strategies, and marketing plans. Prereq: ADHM 140, ADHM 141.

ADHM 384. Beverage Operations. 3 Credits.

Identification and evaluation of beverages served in hospitality establishments with a focus on making quality decisions. Beverages presented will include alcohol (spirits, wines, liqueurs, and beer), coffee, tea, soft drinks, and mineral waters. Prereq: ADHM 140 or 141 and students must be 21 years of age or older as of February 1st.

ADHM 385. Global Fashion Economics. 3 Credits.

Study of factors affecting production, distribution, and consumption of products in domestic and foreign textile and apparel industries. Prereq: ADHM 171 and ECON 105, ECON 201, or ECON 202. Recommended: junior standing. F.

ADHM 386. Merchandise Planning and Buying. 3 Credits.

This course intends to provide an overview of merchandise planning and buying. This course will introduce students to the principles, mathematical formulas and concepts of retail buying and assortment planning. Prereq: ADHM 171.

ADHM 391. Seminar. 1-3 Credits.**ADHM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 394. Individual Study. 1-5 Credits.**ADHM 396. Field Experience. 1-15 Credits.****ADHM 397. Fe/Coop Ed/Internship. 1-4 Credits.****ADHM 399. Special Topics. 1-5 Credits.****ADHM 401. Convention and Meeting Planning. 3 Credits.**

The roles and responsibilities of professional meeting planners are examined. Planning or hosting a convention or meeting for a corporation, association, or special group. Emphasis on audio/visual equipment, room layout, and special requests. Prereq or Co-Req: ADHM 381 or ADHM 140 or ADHM 141 and junior standing. S.

ADHM 403. Resort Development and Management. 3 Credits.

Study and application of concepts in the development and management of a successful resort. The course includes discussions on resort planning, marketing, and finance. Prereq: ADHM 140 or ADHM 141. F.

ADHM 404. Restaurant Operations Management. 3 Credits.

Application of food, beverage, and service management principles in a commercial foodservice setting with emphasis on challenges, responsibilities, and current trends associated with operations management. Co-req: ADHM 404L.

ADHM 404L. Restaurant Operations Management Laboratory. 2 Credits.

This course is a student-driven quantity food production experience focusing on practical applications of commercial foodservice management principles in an upscale dining setting. Co-req: ADHM 404.

ADHM 405. Casino Operations. 3 Credits.

Methods, procedures, and ethical principles utilized in managing a casino operation. Gaming regulations and taxes, mathematics of casino games, casino management, and marketing are addressed. Prereq: Junior standing. F.

ADHM 406. Professional Club Management. 3 Credits.

Exploration of the topics involved in club management. Topics discussed include history and current trends of public and private clubs, country clubs, food and beverage service, marketing, and event and financial management. Prereq: ADHM 140 or ADHM 141 and at least junior standing.

ADHM 410. Dress in World Cultures. 3 Credits.

Analysis of world dress as related to cultural, technological aesthetic, and social patterns. Concepts illustrated through comparative studies of selected world cultures. F, S.

ADHM 411. Food and World Cultures. 3 Credits.

An integrated approach to the study of foods and cultures. Food influences on demography, habitat, social traditions and settings, social status, religious beliefs, gender, and environmental considerations. History, concepts, and principles of cultures and cuisines. F, S.

ADHM 425. Experiential Retailing. 3 Credits.

Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. Prereq: ADHM 140 or ADHM 171 or MGMT 320 or MRKT 320. {Also offered for graduate credit - see ADHM 625.}.

ADHM 435. Cost Controls in Hospitality and Food Service Systems. 3 Credits.

Provides fundamental knowledge of hospitality managerial accounting, cost controls, and financial management. Includes financial statement analysis, cost concepts, cost-volume-profit analysis, calculating and controlling food and beverage costs, pricing, and capital budgeting. Prereq: ADHM 241. {Also offered for graduate credit - see ADHM 635.}.

ADHM 450. Research and Project Development in Interior Design. 3 Credits.

Research, development, and presentation of a programming proposal for a large scale commercial or residential interior. Prereq: ADHM 353 and ADHM 461 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0.

ADHM 452. Comprehensive Interior Design Project. 6 Credits.

Capstone design studio. Student defined problem. Synthesis and implementation of previous course work. S.

ADHM 455. Apparel Design and Assembly. 3 Credits.

Application of the principles and concepts of pattern design and apparel assembly to the creation of garments in a particular category of apparel: tailored jackets, dresses, formalwear and casual sportswear. May be repeated. Prereq: ADHM 155.

ADHM 460. Career Development and Professional Practice. 3 Credits.

Overview of professional standards and promotional activities as related to the interior design profession. Prereq: ADHM 253, ADHM 363 and ADHM 368 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Co-req: ADHM 351 and ADHM 461.

ADHM 461. Building Information Modeling. 3 Credits.

Computer-aided design, modeling and rendering emphasizing applications in interior design. Prereq: ADHM 253, ADHM 363 and ADHM 368 with a grade of C or higher and students must be Interior Design majors with a minimum cumulative GPA of 3.0. Co-req: ADHM 351 and ADHM 460.

ADHM 467. Hospitality Law. 3 Credits.

Legal considerations of hospitality property management and exploration of important legislation. Legal rights, liabilities and responsibilities of the operator in conjunction with management policies. Prereq: Senior standing. F.

ADHM 470. Retail Financial Management and Control. 3 Credits.

Study of retail planning, buying, control, and analysis as it relates to decision-making using computer simulation packages. Prereq: ADHM 171, CSCI 114 or CSCI 116 or MIS 116, MRKT 320, MGMT 320 and ACCT 102. S.

ADHM 479. Hospitality Industry Management Strategies. 3 Credits.

Capstone course for HTM majors. Includes opportunities to analyze hospitality issues, make strategic business decisions, and solve practical problems through case studies and simulations. Prereq: ADHM 360 and ADHM 435, Senior standing. S.

ADHM 481. Capstone in Apparel, Retail Merchandising and Design. 3 Credits.

Critically analyze and propose research-based solutions to problems related to apparel and textiles including production, distribution, and retailing of goods and services. Prereq: ADHM 250 or ADHM 385, ENGL 320, ENGL 322, ENGL 326 or ENGL 357 and at least junior standing.

ADHM 486. Dress and Human Behavior. 3 Credits.

Influence of dress and appearance on human behavior throughout the life cycle. F.

ADHM 489. Study Tour. 1-3 Credits.

Faculty-directed tour to key fashion, design, tourism destinations, or business centers in the U.S. and abroad. Visits to off-campus destinations provide students contact with practicing professionals as they are exposed to the fast pace of a changing global industry. May be repeated. Prereq: ADHM 140 or ADHM 160, ADHM 171.

ADHM 491. Seminar. 1-5 Credits.**ADHM 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ADHM 494. Individual Study. 1-5 Credits.**ADHM 496. Field Experience. 1-15 Credits.****ADHM 499. Special Topics. 1-5 Credits.****ADHM 625. Experiential Retailing. 3 Credits.**

Explore experiential retailing of products, services and experiences that encompass utilitarian and hedonic consumption. Apply strategies for planning, developing, and presenting products or services to create a total consumer experience. {Also offered for undergraduate credit - see ADHM 425.}.

ADHM 635. Cost Controls in Hospitality and Food Service Systems. 3 Credits.

Provides fundamental knowledge of hospitality managerial accounting, cost controls, and financial management. Includes financial statement analysis, cost concepts, cost-volume-profit analysis, calculating and controlling food and beverage costs, pricing, and capital budgeting. {Also offered for undergraduate credit - see ADHM 435.}.

ADHM 690. Graduate Seminar. 1-3 Credits.**ADHM 695. Field Experience. 1-15 Credits.****ADHM 705. Environment and Aging. 3 Credits.**

Analysis of the built environment and how it impacts the aging population. Prereq: Graduate student standing in HD&E.

ADHM 710. Consumer Behavior in Merchandising. 3 Credits.

Evaluation of psychological, sociological, and cultural theories of consumer behavior through the examination of factors influencing the consumer decision-making process.

ADHM 720. Professional Advancement. 3 Credits.

Analysis of leadership and how it affects organizational culture and change through past and current experiences. Various leadership styles examined and a personal leadership philosophy developed for professional advancement in merchandising.

ADHM 730. Product Design, Development and Evaluation. 3 Credits.

Advanced study of issues and management strategies necessary to design and produce a competitively priced product. Examination of the role of globalization and rapidly changing technology on the development of a successful product.

ADHM 736. Entrepreneurship in Dietetics. 3 Credits.

The economics of entrepreneurship, business plan development, and steps in starting your own business related to hospitality or dietetics, including consultation.

ADHM 740. Promotional Strategies in Merchandising. 3 Credits.

Examination of integrated marketing communications (i.e., promotional strategies and techniques) while fostering cultural and global awareness, social responsibility and ethical decision-making in the field of promotion.

ADHM 750. Retail Theory and Current Practice. 3 Credits.

Theoretical and applied analysis of merchandising strategies; assessment of internal and external environmental forces impacting strategic decisions by retail firms; synthesis of past and present trends in order to forecast probable future patterns.

ADHM 765. Merchandising Analytics. 3 Credits.

Merchandising Analytics addresses the use of quantitative data from the merchandising industry to support managerial decision making: specifically, how to format and analyze typical consumer data. Students will apply analytical approaches to problem solving using Microsoft Excel including: Formulas, Functions, Solver, and Pivot Tables.

ADHM 770. International Retail Expansion. 3 Credits.

Comprehensive understanding of theory, practices, and trends on international merchandise management. An analysis of global retail system and the way goods are distributed to consumers in various countries. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 775. Research Methods in Merchandising. 3 Credits.

An overview of the research process used in social science, including an overview and analysis of research methodologies. Also includes a review of current merchandising literature with implications for future research. Prereq: Graduate level statistics course, ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 780. Financial Merchandising Implications. 3 Credits.

The advanced study of financial trends in the merchandising industries; implications related to varied organizational structures. Foci will be on the financial implications of recent advances in the field. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 785. Strategic Merchandise Planning. 3 Credits.

Examination of the executive planning process utilized to develop successful corporate strategies; emphasis on the importance of a market orientation for building customer value and sustaining a competitive advantage. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

ADHM 790. Graduate Seminar. 1-5 Credits.

ADHM 793. Individual Study/Tutorial. 1-5 Credits.

ADHM 794. Practicum/Internship. 1-8 Credits.

ADHM 797S. Comprehensive Project. 1-6 Credits.

An in-depth research study/project in a graduate student's field of study. Prereq: Graduate standing.

Arabic (ARB)

ARB 299. Special Topics. 1-5 Credits.

Architecture (ARCH)

ARCH 194. Individual Study. 1-3 Credits.

ARCH 196. Field Experience. 1-15 Credits.

ARCH 199. Special Topics. 1-5 Credits.

ARCH 231. Creativity and Communication. 3 Credits.

Introductory course that covers the key aspects of the creative problem-solving process as applied in the design of buildings, the landscape, and communities, with an introduction to design visualization and visual thinking, information management, design methods, design process management, studio culture, and professional communication. Prereq: Admission into the second year of the Architecture program.

ARCH 232. Design Technology. 3 Credits.

Introductory exploration of digital design media and environmental technology in architecture and landscape architecture. Prereq or Co-req: ARCH 271 or LA 271.

ARCH 233. Math for Designers. 1 Credit.

Elementary investigations and applied learning activities focused on mathematical influences on architecture through history, proportioning, geometric modeling, trigonometric identities, fractals, algorithms, and parametric modeling. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 271. Architectural Design I. 6 Credits.

Studio course focused on beginning exercises in basic design, incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: . Admission into second year of program.

ARCH 272. Architectural Design II. 6 Credits.

Studio course focused on exercises in basic design incorporating abstract two-dimensional design, functional response to environmental determinants, the articulation of form, spatial organization, and aesthetic judgment. Prereq: ARCH 271.

ARCH 291. Seminar. 1-3 Credits.

ARCH 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 294. Individual Study. 1-5 Credits.

ARCH 296. Field Experience. 1-15 Credits.

ARCH 299. Special Topics. 1-5 Credits.

ARCH 321. History and Theory of Architecture I. 3 Credits.

History and theory of architecture from ancient times through the Renaissance with attention placed on the design connections across cultures and across the globe. Lecture course.

ARCH 322. History and Theory of Architecture II. 3 Credits.

History of architecture from the Baroque to the mid-range of modernism, placed within a global perspective. Lecture course.

ARCH 323. History and Theory of Architecture III. 3 Credits.

History and theory of architecture from the mid-range of modernism to the contemporary, exploring different movements, methods, and ideas, including global and vernacular influences. Prereq: Admission into the second year of the Architecture or Landscape Architecture program.

ARCH 341. Site Design for Architects. 3 Credits.

Intermediate investigations and applied learning activities directed towards understanding building site inventory, analysis, and appropriate design responses. Prereq: ARCH 272.

ARCH 344. Architectural Structures I. 3 Credits.

Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 271 and admission to the professional program.

ARCH 351. Materials & Construction. 3 Credits.

Study of building materials from source through manufacture, focusing on their contribution to design and the study of the assembly processes of construction. Lecture course. Prereq: ARCH 272.

ARCH 371. Architectural Design III. 6 Credits.

Studio courses providing intermediate level exercises in architectural design; responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 272.

ARCH 372. Architectural Design IV. 6 Credits.

Studio course continuing intermediate level exercises in architectural design: responding to contextual, cultural, environmental, climatic, technological, and aesthetic determinants. Prereq: ARCH 371.

ARCH 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ARCH 391. Seminar. 1-3 Credits.

ARCH 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 394. Individual Study. 1-5 Credits.

ARCH 397. Fe/Coop Ed/Internship. 1-4 Credits.

ARCH 399. Special Topics. 1-5 Credits.

ARCH 443. Architectural Structures II. 3 Credits.

Overview of the principles of statics and mechanics of materials and structural concepts relative to building members and frames. Prereq: ARCH 344, ARCH 372.

ARCH 450. Architectural Detailing. 3 Credits.

Study of wood, steel, masonry, and concrete construction assemblies through architectural detailing, with an introduction to specifications and construction documents. Prereq: ARCH 371.

ARCH 453. Environmental Control Systems: Passive Principles. 3 Credits.

Study of architectural design related to thermal comfort, climate, passive solar systems, daylighting, acoustics, and other environmental concerns. Prereq: ARCH 272.

ARCH 454. Environmental Control System: Active System. 3 Credits.

Study of the basic fundamentals of illumination and basic power generation, distribution and service; heating, ventilation, and air-conditioning systems; plumbing systems; and acoustics as they relate to building design. Prereq: ARCH 371, 453.

ARCH 461. Urban Design. 3 Credits.

Study of urban form and urban theory, development, and processes in a historic and contemporary context. Prereq: ARCH 371 or LA 371.

ARCH 471. Architectural Design V. 6 Credits.

Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 372.

ARCH 472. Architectural Design VI. 6 Credits.

Studio courses involving the complex organization of architectural spaces and forms in an urban context. Prereq: ARCH 471.

ARCH 474. International Design Studio. 6 Credits.

Comprehensive design studio experience in advanced architectural studies to be conducted in culturally diverse, international locations. Prereq: ARCH 471.

ARCH 491. Seminar. 1-5 Credits.

ARCH 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ARCH 494. Individual Study. 1-5 Credits.

ARCH 496. Field Experience. 1-15 Credits.

ARCH 497. FE/Coop Ed/Internship. 1-4 Credits.

ARCH 499. Special Topics. 1-5 Credits.

ARCH 721. Non-Western Architectural Traditions. 3 Credits.

Advanced course on the investigation of design methods and building traditions of non-Western cultures and diverse geographic regions. May be repeated.

ARCH 722. Urbanism. 3 Credits.

Advanced course to explore in-depth aspects of urban design. May be repeated.

ARCH 723. Historic Preservation. 3 Credits.

Advanced course to explore the philosophy and techniques of preserving historic buildings. May be repeated.

ARCH 724. Architectural Technology. 3 Credits.

Advanced course to explore the historical and theoretical underpinnings of architectural technology. May be repeated.

ARCH 725. Architecture or the Recent Past. 3 Credits.

Advanced course to explore the major architectural movements and personalities since the mid-20th century. May be repeated.

ARCH 726. Current Architectural Theory. 3 Credits.

Advanced course focused on current issues and the work and design theory of leading architectural practitioners around the world. May be repeated.

ARCH 727. Vernacular Architectural Traditions. 3 Credits.

Advanced course to explore vernacular architectural traditions in North America and elsewhere. May be repeated.

ARCH 728. Sociocultural Issues. 3 Credits.

Advanced course focused on the social issues and movements that have influenced environmental design. May be repeated.

ARCH 763. Thesis Research. 3 Credits.

An introduction to research methodologies and the research required to complete a design thesis in a first professional degree program in Architecture at the graduate level. Completion of a Thesis Proposal and a Thesis Research document in preparation for the Design Thesis Studio to follow. Prereq: ARCH 472.

ARCH 771. Advanced Architectural Design. 6 Credits.

Advanced studio course addressing complex design problems requiring increased self-direction.

ARCH 772. Design Thesis. 8 Credits.

Advanced studio course devoted to the execution of a comprehensive design thesis project, from schematic design through design development, presentation, and review. Prereq: ARCH 663, ARCH 771.

ARCH 781. Professional Practice. 3 Credits.

Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with LA 581.

ARCH 789. Professional Topics in Architecture. 3 Credits.

Various topics related to theoretical or methodological aspects of architecture as a professional discipline. May be repeated.

ARCH 790. Graduate Seminar. 1-3 Credits.**ARCH 793. Individual Study. 1-5 Credits.****ARCH 795. Field Experience. 1-10 Credits.**

Art (ART)

ART 110. Introduction to the Visual Arts. 3 Credits.

Study and analysis of artistic methods and meaning in the visual arts; designed for non-majors.

ART 111. Introduction to Art History. 3 Credits.

Survey of world art from prehistoric to modern times designed for non-majors.

ART 120. Painting I. 3 Credits.

Introduction to basic painting through a variety of materials. Includes historical examples, painting the human figure, using acrylics, oils, pastel, and mixed-media.

ART 122. Studio Technology Foundations. 3 Credits.

Studio Technology Foundations is an introductory-level course in the Department of Visual Art. Lectures, demonstrations, and class assignments offer students an introduction to core technologies in the visual arts and equip students with a working knowledge of their respective operations and applications.

ART 124. Foundations of Design. 3 Credits.

Foundations of Design is an introductory course that provides a comprehensive study of design elements and principles for work in two and three-dimensions.

ART 130. Drawing I. 3 Credits.

Study and application of different drawing media, methods, and techniques. Drawing from the human figure required.

ART 131. Foundations Drawing. 3 Credits.

This course emphasizes observational and technical skill development in a variety of media to solve literal and conceptual problems relating to the history of drawing.

ART 150. Ceramics I. 3 Credits.

Introduction to basic ceramic techniques. Includes wheel-throwing and hand-building techniques, surface decoration, glazing, and firing.

ART 153. Design Thinking and Creative Strategy. 3 Credits.

This course offers an introduction to the theory of art and design production, design processes, and critical theory, as it relates to the creation and reception of visual arts. Through a combination of lectures, reading discussions, and in-class activities students will learn strategies to solve problems and effectively move ideas into visual/conceptual statements.

ART 160. Sculpture I. 3 Credits.

Introduction to basic sculpture materials and techniques. Includes exploration of sculptural form in maquettes and large-scale work; additive and subtractive approaches in wood, stone, and mixed media; casting practice in plaster and hydro-stone.

ART 170. Printmaking I. 3 Credits.

Introduction to basic printmaking techniques and materials. Includes mono-print, collagraph, intaglio, relief, and serigraphy in both traditional and nontoxic methods.

ART 180. Photography I. 3 Credits.

Introduction to basic photography. Includes visual issues of black and white and color photography. Experience with black and white processing and printing.

ART 185. Graphic Design I. 3 Credits.

Introduction to the foundations and principles of graphic design and graphic design software.

ART 194. Individual Study. 1-3 Credits.**ART 196. Field Experience. 1-15 Credits.****ART 199. Special Topics. 1-5 Credits.****ART 210. Art History I. 3 Credits.**

Intensive survey of art from Paleolithic to the Renaissance.

ART 211. Art History II. 3 Credits.

Intensive survey of art from the Renaissance to the present.

ART 220. Painting II. 3 Credits.

Intermediate study, studio practice, and critique. Use of oils, acrylics, watercolor, and mixed media. Painting the human figure and development of individual concept and content. Prereq: ART 120.

ART 230. Drawing II. 3 Credits.

Advanced study and application of different drawing media, methods, techniques and drawing the human figure. Prereq: ART 130.

ART 250. Ceramics II. 3 Credits.

Intermediate study, studio practice, and critique. Development of individual concept and content. Further exploration of forming skills and surface decoration. Introduction to basic mold techniques, clay and glaze theory, and kiln technology. Prereq: ART 150.

ART 260. Sculpture II. 3 Credits.

Intermediate study, practice, and critique. Further exploration of materials and processes. Development of individual concept and content. Prereq: ART 160.

ART 270. Printmaking II. 3 Credits.

Intermediate study, studio practice, and critique. Extension of process and media. Development of individual concept and content. Prereq: ART 170.

ART 280. Digital Image and Output. 3 Credits.

Introduction to digital photography workflow, digital image editing software, and inkjet printing. Prereq: ART 180.

ART 291. Seminar. 1-3 Credits.**ART 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 294. Individual Study. 1-3 Credits.**ART 299. Special Topics. 1-5 Credits.****ART 320. Topics in Painting. 3 Credits.**

Instruction in topics related to the advanced study of painting. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 120.

ART 330. Drawing III. 3 Credits.

Advanced study, studio practice, and critique. Use of mixed-media approaches. Emphasis on individual concept and content. Life drawing emphasis. Prereq: ART 230.

ART 335. Figure Drawing. 3 Credits.

Exploration of the human form through drawing representationally, abstractly and expressively using a variety of media. Studying historic and contemporary use of the figure will be significant. Prereq: ART 130.

ART 350. Topics in Ceramics. 3 Credits.

Instruction in topics related to the advanced study of ceramics. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 150.

ART 360. Sculpture III. 3 Credits.

Advanced study, practice, and critique. Use of mixed-media. Specialization in materials and processes. Emphasis on individual concept and content. Prereq: ART 260.

ART 370. Topics in Printmaking. 3 Credits.

Instruction in topics related to the advanced study of printmaking. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 170.

ART 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ART 380. Topics in Photography. 3 Credits.

Instruction in topics related to the advanced study of photography. Studio techniques, project development, and effective visual and oral communication practices are emphasized. May be repeated for credit. Prereq: ART 180.

ART 385. Advanced Topics in Graphic Design. 3 Credits.

Development of concepts and practices related to graphic design, digital technologies and their applications in design and visual arts. May be repeated for credit. Prereq: ART 185.

ART 389. Art Theory and Criticism. 3 Credits.

This course covers the development and application of art theory and criticism from the advent of photography to the present. The course presents theory and criticism as fluid methods of understanding art. The course covers standard theories as well as their critical applications. Prereq: ART 210, ART 211.

ART 391. Seminar. 1-3 Credits.**ART 392. Global Practicum: Study Abroad. 1-3 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 394. Individual Study. 1-3 Credits.**ART 399. Special Topics. 1-5 Credits.****ART 420. Baccalaureate Studio: Painting. 3 Credits.**

This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 320.

ART 430. Drawing IV. 3 Credits.

Advanced study, studio practice and critique in drawing. Exploration in individual concept, process and professional preparation. May be repeated. Prereq: ART 330.

ART 435. Advanced Figure Drawing. 3 Credits.

Advanced study, studio practice and critique in figure drawing. Continued exploration of the human form and development of an individual concept. May be repeated. Prereq: ART 335.

ART 450. Baccalaureate Studio: Ceramics. 3 Credits.

This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 350.

ART 451. History of American Art. 3 Credits.

Study of American art from pre-Columbian through contemporary (including Native American), emphasizing its highly individual nature and its effect on world art. Prereq: ART 210, ART 211.

ART 452. Contemporary Art. 3 Credits.

Study of the development of contemporary art examining its cultural and intellectual basis; includes analysis of current art imagery and readings in art theory and criticism.

ART 453. Topics in Art History. 3 Credits.

As an upper-division course in a specialized topic in Art History, the subject matter of the course varies by semester, allowing the curriculum to be more responsive and flexible in the subjects it addresses. May be repeated. Prereq: ART 210 or ART 211.

ART 460. Sculpture IV. 3 Credits.

Advanced study, studio practice and critique in sculpture. A focus on current issues in sculpture with innovative use of form, process and materials centered in a personal use of content and formal issues. May be repeated. Prereq: ART 360.

ART 470. Baccalaureate Studio: Printmaking. 3 Credits.

This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 370.

ART 480. Baccalaureate Studio: Photography. 3 Credits.

This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 380.

ART 485. Baccalaureate Studio: Graphic Design. 3 Credits.

This course facilitates studio production for the Baccalaureate process. Work-flow will follow specific deadlines that accompany the critique schedule in ART 489. You will be working with your studio professor to prepare and develop a body of work that will culminate in an exhibition at the end of the semester. May be repeated for credit. Prereq: ART 385.

ART 489. Baccalaureate Project. 3-6 Credits.

Capstone research and creative experience within a specific area of interest with emphasis on refinement of aesthetic applications of techniques and media. May be repeated.

ART 491. Seminar. 1-5 Credits.**ART 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ART 494. Individual Study. 1-5 Credits.**ART 496. Field Experience. 1-15 Credits.****ART 499. Special Topics. 1-5 Credits.****ART 690. Graduate Seminar. 1-5 Credits.****ART 793. Individual Study/Tutorial. 1-5 Credits.**

Arts Humanities and Social Sciences (AHSS)

Courses

AHSS 188. Cultural Diversity Scholars. 2 Credits.

This course is required for all new first-year students and transfer students receiving the Cultural Diversity Tuition Discount. The course covers topics such as written and oral communication, critical thinking, and orientation to campus resources. Restricted to recipients of the cultural diversity tuition discount.

AHSS 191. Seminar. 1-5 Credits.**AHSS 199. Special Topics. 1-5 Credits.****AHSS 472. Introduction to Publishing. 3 Credits.**

This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. {Also offered for graduate credit - See AHSS 672.}.

AHSS 476. Practicum in Publishing. 3 Credits.

The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. Prereq: AHSS 472. {Also offered for graduate credit - See AHSS 676.}.

AHSS 491. Seminar. 1-5 Credits.

AHSS 493. Undergraduate Research. 1-5 Credits.

AHSS 496. Field Experience. 1-15 Credits.

AHSS 672. Introduction to Publishing. 3 Credits.

This introductory class will familiarize students with the history, business, and practice of small press publishing. Course lectures, readings, and activities focus on various facets of publishing history, production, and marketing processes. The course includes an orientation to North Dakota State University Press - a teaching and academic press located on the NDSU campus - and a hands-on experience in publishing a current chapbook manuscript for the press. The course will address the following areas of small press publishing: history of the small press movement; the history and aesthetics of the book; manuscript acquisitions and editing; the business of publishing; design aspects of publishing; copyright laws and permissions; promotion and marketing; and digital publishing. {Also offered for undergraduate credit - See AHSS 472.}.

AHSS 676. Practicum in Publishing. 3 Credits.

The Practicum in Publishing implements knowledge and background gained during the Introduction to Publishing course. Students will obtain and apply the skills of a publisher as they undertake editorial, publicity, and marketing activities for the following year's book releases. Students will take on responsibilities of key roles in social media marketing and event development. This practicum offers in-depth, real-life experience with a decades-old publishing house, putting into practice current methods and customs of scholarly and literary publishing, while meeting real-time publishing deadlines and schedules in preparation for national distribution of North Dakota State University Press books. Prereq: AHSS 672. {Also offered for undergraduate credit - See AHSS 476.}.

AHSS 690. Seminar. 1-5 Credits.

AHSS 695. Field Experience. 1-15 Credits.

AHSS 796. Special Topics. 1-5 Credits.

Athletics (ATHL)

ATHL 223. Intercollegiate Sports Participation. 1 Credit.

Participation on an intercollegiate sports team. May be repeated.

ATHL 323. Intercollegiate Sports Participation. 1 Credit.

Participation on an intercollegiate sports team. May be repeated.

Biochemistry (BIOC)

BIOC 194. Individual Study. 1-5 Credits.

BIOC 196. Field Experience. 1-15 Credits.

BIOC 199. Special Topics. 1-5 Credits.

BIOC 260. Elements of Biochemistry. 4 Credits.

Protein structure, function conformation, and dynamics; enzymes, DNA-RNA: structure and flow of genetic information; biological membranes; metabolism. 4 lectures. Prereq: CHEM 117 or CHEM 122, CHEM 140 or CHEM 240.

BIOC 291. Seminar. 1-3 Credits.

BIOC 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 294. Individual Study. 1-5 Credits.

BIOC 299. Special Topics. 1-5 Credits.

BIOC 303. The Science of Learning. 1 Credit.

This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

BIOC 350. Fundamentals of Forensic DNA Analysis. 2 Credits.

Principles, technologies, and analysis of genetic information (DNA) and its applications to forensic science, in particular, identity profiling.

BIOC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BIOC 391. Seminar. 1-3 Credits.**BIOC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 394. Individual Study. 1-5 Credits.**BIOC 399. Special Topics. 1-5 Credits.****BIOC 460L. Foundations of Biochemistry I Laboratory. 1 Credit.**

Laboratory to accompany BIOC 460. Introduction to techniques and instrumentation in biochemistry. Co-Req: BIOC 460.

BIOC 460. Foundations of Biochemistry and Molecular Biology I. 3 Credits.

Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. Prereq: CHEM 240 or CHEM 341. Recommended Prereq: CHEM 342. {Also offered for graduate credit - see BIOC 660.}.

BIOC 461. Foundations of Biochemistry and Molecular Biology II. 3 Credits.

Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones, regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. Recommended prereq: BIOC 460. {Also offered for graduate credit - see BIOC 661.}.

BIOC 473. Methods of Biochemical Research. 3 Credits.

Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 461. {Also offered for graduate credit - see BIOC 673.}.

BIOC 474. Methods of Recombinant DNA Technology. 3 Credits.

Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 460. Co-req: BIOC 461. Recommended: ZOO 315. {Also offered for graduate credit - see BIOC 674.}.

BIOC 475. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.

This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 460. {Also offered for graduate credit - see BIOC 675.}.

BIOC 483. Cellular Signal Transduction Processes and Metabolic Regulations. 3 Credits.

Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. {Also offered for graduate credit - see BIOC 683.}.

BIOC 487. Molecular Biology of Gene Expression. 3 Credits.

This is an advanced undergraduate course designed to analyze current information regarding biochemistry and molecular biology of gene expression and regulation in prokaryotes, eukaryotes and archaea, with primary emphasis on eukaryotic systems. Prereq: BIOC 460, BIOC 461.

BIOC 491. Seminar. 1-5 Credits.**BIOC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOC 493. Undergraduate Research. 1-5 Credits.**BIOC 494. Individual Study. 1-5 Credits.****BIOC 496. Field Experience. 1-15 Credits.****BIOC 499. Special Topics. 1-5 Credits.****BIOC 660. Foundations of Biochemistry and Molecular Biology I. 3 Credits.**

Rigorous treatment of biomolecules, generation and use of metabolic energy, biosynthesis, metabolic regulation; storage, transmission, and expression of genetic information. 3 lectures. {Also offered for undergraduate credit - see BIOC 460.}.

BIOC 661. Foundations of Biochemistry and Molecular Biology II. 3 Credits.

Interrelations between metabolic pathways and controls, with emphasis on mammalian systems; biochemistry of specialized tissues, fluids, and hormones; regulation of gene expression in eukaryotes; genetic defects in metabolism. 3 lectures. {Also offered for undergraduate credit - see BIOC 461.}.

BIOC 673. Methods of Biochemical Research. 3 Credits.

Advanced separation, characterization, and enzymological techniques for research in the biological sciences are emphasized. 1 lecture, 2 three-hour laboratories. Prereq: BIOC 661. Coreq: BIOC 701. {Also offered for undergraduate credit - see BIOC 473.}.

BIOC 674. Methods of Recombinant DNA Technology. 3 Credits.

Principles and techniques of recombinant DNA construction, gene cloning, and analysis of gene structure. 1 lecture, 2 three-hour laboratories. Recommended co-req: BIOC 702. {Also offered for undergraduate credit - see BIOC 474.}.

BIOC 675. Computer Applications in Biochemistry and Molecular Biology. 3 Credits.

This course will cover basic and advanced biochemical calculations and the use of computer programs to make these calculations. Programs for the presentation of data and seminars will also be presented. Prereq: BIOC 660. {Also offered for undergraduate credit - see BIOC 475.}.

BIOC 683. Cellular Signal Transduction Processes and Metabolic Regulation. 3 Credits.

Advanced topics in regulation of metabolic processes including signal transduction, reversible and irreversible covalent modification, hormonal effects, protein turnover, and related phenomena. 2 lectures. Prereq: BIOC 702. F (alternate years) {Also offered for undergraduate credit - see BIOC 483.}.

BIOC 690. Graduate Seminar. 1-3 Credits.**BIOC 696. Special Topics. 1-5 Credits.****BIOC 701. Comprehensive Biochemistry I. 4 Credits.**

Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures.

BIOC 702. Comprehensive Biochemistry II. 4 Credits.

Comprehensive treatment of the chemistry and biochemistry of proteins, nucleic acids, carbohydrates, lipids, vitamins, hormones, and the specific metabolism of these substances. 4 lectures. Recommended: BIOC 701.

BIOC 716. Protein and Enzyme Biochemistry. 3 Credits.

Advanced topics in protein properties and structure, and the influence of these factors on enzyme kinetics and mechanism. 3 lectures. Prereq: BIOC 702. S (alternate years).

BIOC 719. Molecular Biology of Gene Expression and Regulation. 3 Credits.

Advanced topics in molecular biology and regulation in prokaryotes, eukaryotes, and archaea; early events in developmental gene expression. 3 lectures. Prereq: BIOC 702. F (alternate years).

BIOC 723. Structural Basis of Membrane Transport and Signaling. 3 Credits.

Advanced topics discussing how three-dimensional structures of membrane proteins dictate their function in coordinating the extracellular environment with intracellular processes. Prereq: BIOC 660 or BIOC 701.

BIOC 790. Graduate Seminar. 1-3 Credits.**BIOC 791. Temporary/Trial Topics. 1-5 Credits.****BIOC 793. Individual Study/Tutorial. 1-5 Credits.****BIOC 796. Special Topics. 1-5 Credits.****BIOC 798. Master's Thesis. 1-10 Credits.****BIOC 892. Graduate Teaching Experience. 1-6 Credits.****BIOC 899. Doctoral Dissertation. 1-15 Credits.**

Biological Sciences (BIOL)

BIOL 100L. Non-Majors Biology Lab. 1 Credit.

Laboratory experience to introduce the application of the scientific method across a wide scale of biological topics, including molecular biology, the organism, evolution, and ecology. This lab may be taken as a co-requisite with BIOL 111, BIOL 124 or BIOL 126. Co-req: BIOL 111 or BIOL 124 or BIOL 126.

BIOL 104. Human Anatomy and Physiology Prep. 1 Credit.

This course is designed to improve the success of students when taking Human Anatomy and Physiology. The focus of the course will be to develop language literacy, visual literacy, study skills, and the understanding of science concepts that are fundamental to Human Anatomy and Physiology. Restrictions: First-year students.

BIOL 111. Concepts of Biology. 3 Credits.

Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 124. Environmental Science. 3 Credits.

Ecological principles related to human cultures, resource use, and environmental alterations. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 126. Human Biology. 3 Credits.

Consideration of selected problems in human biology. For credit as a lecture/lab pair, students should take BIOL 100L as a co-requisite.

BIOL 150L. General Biology I Laboratory. 1 Credit.

Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 150. General Biology I. 3 Credits.

Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 151L. General Biology II Laboratory. 1 Credit.

An introduction to the biology of living organisms and their interactions with each other and their environments. Examples primarily involve plants and animals, but include other groups of organisms as well. Prereq: BIOL 150L.

BIOL 151. General Biology II. 3 Credits.

An introduction to the biology of living organisms and their interactions with each other and their environments. Examples primarily involve plants and animals, but include other groups of organisms as well.

BIOL 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will be introduced to skills and techniques used by successful college students. Topics will include campus resources, study techniques, time management, goal setting, degree planning, and career and major orientation.

BIOL 193. Undergraduate Research. 1-5 Credits.**BIOL 194. Individual Study. 1-5 Credits.****BIOL 196. Field Experience. 1-15 Credits.****BIOL 199. Special Topics. 1-5 Credits.****BIOL 220. Human Anatomy and Physiology I. 3 Credits.**

An in-depth introduction to structure and function of human organ systems' cells, tissues, the integumentary system, the skeletal system, joints, muscle and muscular system, nervous tissue and nervous system, and the special senses. F.

BIOL 220L. Human Anatomy and Physiology I Laboratory. 1 Credit.

An in-depth introduction to structure and function of human organ systems' cells, tissues, the integumentary system, the skeletal system, joints, muscle and muscular system, nervous tissue and nervous system, and the special senses. F.

BIOL 221L. Human Anatomy and Physiology II Laboratory. 1 Credit.

A continuation of BIOL 220, 220L; the endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems and development. S.

BIOL 221. Human Anatomy and Physiology II. 3 Credits.

A continuation of BIOL 220, 220L; the endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems and development. Prereq: BIOL 220. S.

BIOL 252. Plant and Animal Diversity. 3 Credits.

An introduction to the anatomy and physiology of higher plants and animals. An integrative and comparative look at the organization and function of plants and animals. Prereq: BIOL 150 and BIOL 151.

BIOL 270. Undergraduate Research Experience: Antibiotic Discovery. 3 Credits.

This course is an authentic research experience for undergraduates. Students in the course will participate in a larger national research initiative aimed at discovering new antibiotics produced by soil bacteria. Prereq: BIOL 150 and BIOL 151.

BIOL 271. Undergraduate Research Experience: Field Biology and Experimental Ecology. 3 Credits.

This course is an authentic research experience for undergraduates. Students in the course will participate in collaborative research projects with their teams, each team will design its own unique project focused on the wildlife population of interest. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 272. Undergraduate Research Experience: Learning in Biology. 3 Credits.

This course is an authentic research experience for undergraduates. Students in the course will explore the processes of learning and instruction in undergraduate biology through critical reading of literature, experimental design, data analysis, and communication of research findings. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 273. Undergraduate Research Experience: Genomic Analysis. 3 Credits.

This course is an authentic research experience that provides students the opportunity to learn lab and analysis techniques used in genomics research, including sequencing of prokaryotic and eukaryotic DNA, and annotation of *Drosophila* sp. DNA. Prereq: BIOL 150 and BIOL 150L and BIOL 151 and BIOL 151L.

BIOL 274. Undergraduate Research Experience: Biomedical Research Analysis. 3 Credits.

This is an authentic research experience for undergraduates. Through critical reading of the literature, students in this course will explore elements of biomedical research including the ethics of working with human subjects, experimental design of clinical studies, and statistical analysis and interpretation of results. The course will culminate with students using public databases to conduct their own biomedical analysis. Prereq: BIOL 150, BIOL 150L, BIOL 151 and BIOL 151L.

BIOL 275. Undergraduate Research Experience: Insect Behavior. 3 Credits.

This course is an authentic research experience for undergraduates focused on learning the methods used to study animal behavior. Students in the course will participate in collaborative research projects with their teams - each team will design its own unique project focused on the behavior of aphids and their predators/parasitoids. Prereq: BIOL 150, BIOL 150L, BIOL 151, BIOL 151L.

BIOL 291. Seminar. 1-3 Credits.**BIOL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 293. Undergraduate Research. 1-5 Credits.**BIOL 294. Individual Study. 1-5 Credits.****BIOL 296. Field Experience. 1-15 Credits.****BIOL 299. Special Topics. 1-5 Credits.****BIOL 315. Genetics. 3 Credits.**

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with PLSC 315. F, S.

BIOL 315L. Genetics Laboratory. 1 Credit.

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with PLSC 315L. F, S.

BIOL 359. Evolution. 3 Credits.

Evolution is the process by which species change over time through descent with modification. This course will focus on understanding the key biological concepts of heritability of traits, variation, adaptation through selection and evolutionary change at all scales. Prereq: BIOL 150, BIOL 151.

BIOL 364. General Ecology. 3 Credits.

Ecological principles associated with organism environment interactions, populations, communities, and ecosystems. Quantitative approach with examples (animal, plant, microbial) included. Prereq: BIOL 150 and BIOL 151.

BIOL 370. Cell Biology. 3 Credits.

Structure and function of cells, including cell surfaces, membranes, organelles, cytoskeleton, cell division, cell physiology, and methods used in cell studies. Prereq: BIOL 150 and BIOL 151.

BIOL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BIOL 391. Seminar. 1-3 Credits.**BIOL 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 393. Undergraduate Research. 1-5 Credits.**BIOL 394. Individual Study. 1-5 Credits.****BIOL 396. Field Experience. 1-15 Credits.****BIOL 399. Special Topics. 1-5 Credits.****BIOL 410. Comparative Chordate Morphology. 3 Credits.**

This is a combination lecture/lab course designed to introduce you to the systematics, history, and structure of the chordates, particularly the craniates. Structural and functional similarities and differences among organs and organ systems of representative organisms as well as the use of comparative morphology as a tool to better understand the process of chordate evolution will be emphasized. Prereq: BIOL 150, BIOL 151, BIOL 252.

BIOL 414. Plant Systematics. 3 Credits.

Plant identification, nomenclature and classification are aspects of plant systematics. Modern plant systematics uses molecular approaches in addition to visual traits such as morphology to order plants in accordance with our current understanding of evolution and the 'Tree of Life'. The course includes outdoor activities to learn plant identification as long as the weather permits. Prereq: BIOL 150 and BIOL 151.

BIOL 444. Vertebrate Histology. 3 Credits.

Study of the microscopic anatomy of vertebrate tissues and organs, especially mammals. Classification and identification of epithelium, connective, muscle, and nervous tissue types. Study of these tissue types in the context of major organ systems (circulatory, lymphoid, endocrine, integumentary, digestive, urinary, and respiratory). Prereq: BIOL 150, BIOL 151.

BIOL 450. Invertebrate Zoology. 3 Credits.

Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 650.}

BIOL 452. Ichthyology. 3 Credits.

Biology and taxonomy of fishes. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 652.}

BIOL 454. Herpetology. 3 Credits.

Primarily a field and laboratory course focusing on amphibians and reptiles. Students will learn about the biology, ecology, evolution, and life history of reptiles and amphibians utilizing a hands-on approach. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 654.}.

BIOL 456. Ornithology. 3 Credits.

Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 656.}.

BIOL 458. Mammalogy. 3 Credits.

Biology and taxonomy of mammals. Prereq: BIOL 150, BIOL 151. F {Also offered for graduate credit - see BIOL 658.}.

BIOL 460. Animal Physiology. 3 Credits.

Study of the physical and chemical principles that govern cell, tissue, organ, organ system, and organismal function. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 660.}.

BIOL 461. Plant Ecology. 3 Credits.

Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 661.}.

BIOL 462. Physiological Ecology. 3 Credits.

Study of the physiological mechanisms underlying life-history trade-offs and constraints in an ecological and evolutionary context. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 662.}.

BIOL 463. Animal Behavior. 3 Credits.

Description of the principal behavior patterns of animals with consideration of ecological, evolutionary, and internal mechanisms. Prereq: BIOL 151, BIOL 151L.

BIOL 464. Endocrinology. 3 Credits.

Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 664.}.

BIOL 465. Hormones and Behavior. 3 Credits.

Study of the organizational and activational role endocrine systems play in regulating animal behaviors. These studies will be explored within an ecological and evolutionary framework. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 665.}.

BIOL 470. Freshwater Ecology and Limnology. 3 Credits.

Freshwater ecology is the study of the relationship between freshwater organisms and their environment. Limnology is the study of inland waters, including lakes, reservoirs, rivers, streams, wetlands and groundwater. This course will provide an overview of freshwater ecology & limnology, emphasizing fundamental interactions and processes. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - See BIOL 670.}.

BIOL 472. Structure and Diversity of Plants and Fungi. 3 Credits.

We will focus on structure and morphology of plants and fungi, as well as explore the diversity or adaptations plants and fungi have acquired to overcome a variety of environmental and habitat challenges. Prereq: BIOL 150, BIOL 151.

BIOL 475. Conservation Biology. 3 Credits.

Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. Prereq: BIOL 150, BIOL 151. {Also offered for graduate credit - see BIOL 675.}.

BIOL 476. Wildlife Ecology and Management. 3 Credits.

Application of ecological principles to management of game and non-game wildlife populations. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 676.}.

BIOL 477. Wildlife and Fisheries Management Techniques. 3 Credits.

Students will learn techniques used in the study and management of fish and wildlife populations. Students will design an independent field research project to be executed during a field trip (typically 2-4 days in length). Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 677.}.

BIOL 479. Biomedical Genetics and Genomics. 3 Credits.

This course will cover the diagnoses, clinical presentations, prevention and treatments of hereditary diseases (Mendelian and complex); the ever-increasing roles that genetics and genomics have in advancing medicine (including personalized medicine). Prereq: BIOL 150, BIOL 151 and BIOL 315 or PLSC 315. {Also available for graduate credit - see BIOL 679.}.

BIOL 480. Ecotoxicology. 3 Credits.

Ecotoxicology, the behavior of pollutants in and effects on ecosystems; top-down and bottom-up approaches for assessment/prediction of effects on populations, communities and ecosystems; ecotoxicological testing at single/multi-species levels; biomarkers; passive/active biomonitoring. Prereq: BIOL 151 and BIOL 151L. {Also offered for graduate credit - see BIOL 680.}.

BIOL 481. Wetland Science. 3 Credits.

Definition of wetlands, biogeochemistry, ecophysiology and adaptations to wetland conditions in plants and animals, biodiversity and productivity, wetland ecology, applications of wetlands for treatment of wastewater and other forms of bioremediation. Prereq: BIOL 151, BIOL 151L. {Also offered for graduate credit - see BIOL 681.}.

BIOL 482. Developmental Biology. 3 Credits.

Analysis of the processes of development, with an emphasis on animal development. Topics range from classical embryology to the cellular and molecular basis of development. Prereq: BIOL 150 and BIOL 151. {Also offered for graduate credit - see BIOL 682.}.

BIOL 483. Cellular Mechanisms of Diseases. 3 Credits.

This course will be focused on the cellular and molecular bases of selected diseases and some non-human animal diseases. Key cellular pathways/processes and molecular mechanisms that, when altered/disrupted, result in pathological changes/conditions will be discussed from scientific (e.g., functions, regulation and structures of cells, proteins and organs) and medical (e.g., clinical presentation, diagnostic and treatment) perspectives.

Prereq: BIOL 150, BIOL 151, BIOL 315 or PLSC 315, BIOL 370. {Also offered for graduate credit - See BIOL 683.}.

BIOL 491. Seminar. 1-5 Credits.**BIOL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 493. Undergraduate Research. 1-5 Credits.**BIOL 494. Individual Study. 1-5 Credits.****BIOL 496. Field Experience. 1-15 Credits.****BIOL 499. Special Topics. 1-5 Credits.****BIOL 650. Invertebrate Zoology. 3 Credits.**

Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. {Also offered for undergraduate credit - see BIOL 450.}.

BIOL 652. Ichthyology. 3 Credits.

Biology and taxonomy of fishes. {Also offered for undergraduate credit - see BIOL 452.}.

BIOL 654. Herpetology. 3 Credits.

Primarily a field and laboratory course focusing on amphibians and reptiles. Students will learn about the biology, ecology, evolution, and life history of reptiles and amphibians utilizing a hands-on approach. {Also offered for undergraduate credit - see BIOL 454.}.

BIOL 656. Ornithology. 3 Credits.

Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. {Also offered for undergraduate credit - see BIOL 456.}.

BIOL 658. Mammalogy. 3 Credits.

Biology and taxonomy of mammals. {Also offered for undergraduate credit - see BIOL 458.}.

BIOL 660. Animal Physiology. 3 Credits.

Study of the physical and chemical principles that govern cell, tissue, organ, organ system, and organismal function. {Also offered for undergraduate credit - see BIOL 460.}.

BIOL 661. Plant Ecology. 3 Credits.

Ecological structure, processes, and patterns observed with plant communities and populations as influenced by environmental conditions. Illustrations provided with local fieldwork. {Also offered for undergraduate credit - see BIOL 461.}.

BIOL 662. Physiological Ecology. 3 Credits.

Study of the physiological mechanisms underlying life-history trade-offs and constraints in an ecological and evolutionary context. S {Also offered for undergraduate credit - see BIOL 462.}.

BIOL 664. Endocrinology. 3 Credits.

Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. {Also offered for undergraduate credit - see BIOL 464.}.

BIOL 665. Hormones and Behavior. 3 Credits.

Study of the organizational and activational role endocrine systems play in regulating animal behaviors. These studies will be explored within an ecological and evolutionary framework. {Also offered for undergraduate credit - see BIOL 465.}.

BIOL 675. Conservation Biology. 3 Credits.

Integrative approach to the study and conservation of biodiversity. Application of principles from various sub-disciplines of the biological and social sciences to current conservation problems. {Also offered for undergraduate credit - see BIOL 475.}.

BIOL 676. Wildlife Ecology and Management. 3 Credits.

Application of ecological principles to management of game and non-game wildlife populations. {Also offered for undergraduate credit - see BIOL 476.}.

BIOL 677. Wildlife and Fisheries Management Techniques. 3 Credits.

Students will learn techniques used in the study and management of fish and wildlife populations. Students will design an independent field research project to be executed during a field trip (typically 2-4 days in length). {Also offered for undergraduate credit - see BIOL 477.}.

BIOL 679. Biomedical Genetics and Genomics. 3 Credits.

This course will cover the diagnoses, clinical presentations, prevention and treatments of hereditary diseases (Mendelian and complex); the ever-increasing roles that genetics and genomics have in advancing medicine (including personalized medicine). {Also available for undergraduate credit - see BIOL 479.}.

BIOL 680. Ecotoxicology. 3 Credits.

Ecotoxicology, the behavior of pollutants in and effects on ecosystems; top-down and bottom-up approaches for assessment/prediction of effects on populations, communities and ecosystems; ecotoxicological testing at single/multi-species levels; biomarkers; passive/active biomonitoring. {Also offered for undergraduate credit - see BIOL 480.}.

BIOL 681. Wetland Science. 3 Credits.

Definition of wetlands, biogeochemistry, ecophysiology and adaptations to wetland conditions in plants and animals, biodiversity and productivity, wetland ecology, applications of wetlands for treatment of wastewater and other forms of bioremediation. {Also offered for undergraduate credit - see BIOL 481.}.

BIOL 682. Developmental Biology. 3 Credits.

Analysis of the processes of development, with an emphasis on animal development. Topics range from classical embryology to the cellular and molecular basis of development. {Also offered for undergraduate credit - see BIOL 482.}.

BIOL 683. Cellular Mechanisms of Disease. 3 Credits.

This course will be focused on the cellular and molecular bases of selected diseases and some non-human animal diseases. Key cellular pathways/processes and molecular mechanisms that, when altered/disrupted, result in pathological changes/conditions will be discussed from scientific (e.g., functions, regulation and structures of cells, proteins and organs) and medical (e.g., clinical presentation, diagnostic and treatment) perspectives. {Also offered for undergraduate credit. See BIOL 483.}.

BIOL 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BIOL 695. Field Experience. 1-15 Credits.**BIOL 696. Special Topics. 1-5 Credits.****BIOL 790. Graduate Seminar. 1-3 Credits.****BIOL 791. Temporary/Trial Topics. 1-5 Credits.****BIOL 793. Individual Study/Tutorial. 1-5 Credits.****BIOL 794. Practicum/Internship. 1-10 Credits.****BIOL 795. Field Experience. 1-15 Credits.****BIOL 796. Special Topics. 1-5 Credits.****BIOL 797. Master's Paper. 1-3 Credits.**

Literature review, research, and preparation for paper required for the comprehensive study option. Graded S or U.

BIOL 798. Master's Thesis. 1-10 Credits.**BIOL 820. Advanced Cell Biology. 3 Credits.**

In-depth survey of cell biology, including studies of membranes, secretion cytoskeleton, cellular movement organelles, and gene regulation.

BIOL 825. Biology of Aging. 3 Credits.

This course will take an integrative approach to understanding the biology of aging. We will examine both the evolutionary causes and underlying mechanisms of aging in diverse organisms including humans.

BIOL 826. Integrative Organismal Biology. 3 Credits.

This course will take an integrative approach in examining the evolutionary and ecological factors and the physiological mechanisms that contribute to variation among individuals in diverse organisms.

BIOL 842. Quantitative Biology. 3 Credits.

Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. S.

BIOL 850. Advanced Ecology. 3 Credits.

This course covers classical ecological literature and current literature focusing on ecological research philosophy and techniques. An overview/introduction of a variety of statistical methods for analyzing ecological data is covered.

BIOL 851. Advanced Conservation Biology. 3 Credits.

This class will cover recent developments in the field of conservation biology, with a specific focus on recent literature. Areas of focus will include Evolutionary Conservation and Conservation Genetics.

BIOL 859. Evolution. 3 Credits.

Evolution is the process by which species change over time through descent with modification. This course will focus on understanding the different applications of evolutionary theory to current issues in the biological sciences.

BIOL 860. Evolutionary Ecology. 3 Credits.

Lecture-discussion course on recent developments in evolutionary theory and their implications in the study of animal adaptation, ecology, and behavior.

BIOL 861. Advanced Physiology - Physiology of Extremes. 3 Credits.

This course will provide a greater understanding of the physiological systems of plants and animals. It exposes students to advanced physiological concepts and current literature perspectives on a variety of physiological systems and processes. This course is designed to increase the student's understanding of the mechanisms involved in the functioning of plant and animals with a specific focus on advanced topics and the physiology of extremes. A basic understanding of plant and animal physiology is expected prior to taking this course, as this course takes an in-depth look at the physiological extremes present in the plant and animal kingdoms.

BIOL 862. Environment and Adaptation. 3 Credits.

Environmental factors and responses evidenced with life-history patterns, genetic variation, population dynamics, species-interactions, and physiological processes.

BIOL 865. Biological Rhythms. 3 Credits.

This course will provide a greater understanding of the nature of endogenous time keeping ("clocks") and will investigate A) the biological mechanisms by which these 'clocks' interface with the environment, both biotic (e.g. social behavioral) and abiotic, to B) enable adaptive responses. This class will focus almost exclusively on vertebrates, but may include classic examples and insights gained from plants and invertebrates.

BIOL 866. Advanced Animal Behavior. 3 Credits.

This course investigates current concepts and research areas in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution.

BIOL 876. Population Dynamics. 3 Credits.

Principles and mechanics of animal population dynamics. Prereq: an interest in working with numbers.

BIOL 877. Analysis of Population and Demographic Data. 3 Credits.

Contemporary maximum likelihood approaches to estimating abundance, survival, reproduction, and dispersal in free-living populations. Goodness-of-fit and information theory applied to population model selection. Examples from a variety of real populations. Prereq: BIOL 876, STAT 660 or STAT 661, ENT 842.

BIOL 884. Biological Research Principles. 3 Credits.

Discussion, analysis of published research papers, lectures on selected topics, and student research proposal. Prereq: STAT 725.

BIOL 892. Graduate Teaching Experience. 1-6 Credits.**BIOL 893. Individual Study/Tutorial. 1-5 Credits.****BIOL 895. Field Experience. 1-15 Credits.****BIOL 899. Doctoral Dissertation. 1-15 Credits.**

Biomedical Engineering (BME)

BME 220. Introduction to Biomedical Engineering. 2 Credits.

This course covers the fundamental concepts in a variety of biomedical engineering topics and applications, including biomechanics, biosensors, biomaterials, biomanufacturing and bio data processing. Prereq: MATH 165 or MATH 146, MATH 128 or MATH 129, and sophomore standing.

BME 790. Graduate Seminar. 1-5 Credits.**BME 793. Individual Study/Tutorial. 1-5 Credits.****BME 795. Field Experience. 1-15 Credits.****BME 797. Master's Paper. 1-3 Credits.****BME 798. Master's Thesis. 1-10 Credits.****BME 892. Graduate Teaching Experience. 1-6 Credits.****BME 899. Doctoral Dissertation. 1-15 Credits.**

Botany (BOT)

BOT 797. Master's Paper. 1-3 Credits.**BOT 798. Master's Thesis. 1-10 Credits.****BOT 899. Doctoral Dissertation. 1-15 Credits.**

Business Administration (BUSN)

BUSN 130. Basic Skills in Leadership and Personal Marketing. 3 Credits.

This course challenges students to begin the process of developing their leadership abilities and then developing the skills to promote their ideas and persuade others in personal and professional contexts. Grounded in an understanding of the art of leading and influence in various cultures and professions, students will assess their own leadership characteristics, analyze and reflect on leadership in everyday life, and then develop a plan and skills to persuasively present themselves and ideas to others, both personally and professionally. Open to all majors.

BUSN 189. Skills for Academic Success. 1 Credit.

Development of skills and techniques for academic success. Includes study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Introduction to campus resources and governance. Cross-listed with ABEN 189, AGRI 189, HD&E 189, ME 189, and UNIV 189.

BUSN 191. Seminar. 1-5 Credits.

BUSN 194. Individual Study. 1-3 Credits.

BUSN 196. Field Experience. 1-15 Credits.

BUSN 199. Special Topics. 1-5 Credits.

BUSN 280. Introduction To Business. 3 Credits.

This course provides an overview of the environment of business, legal forms of business, and the major functional areas of business including management, marketing, accounting, and finance. This course is open to students pursuing any major.

BUSN 291. Seminar. 1-3 Credits.

BUSN 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 294. Individual Study. 1-3 Credits.

BUSN 296. Field Experience. 1-15 Credits.

BUSN 299. Special Topics. 1-5 Credits.

BUSN 318. Taxation in Management Decisions. 3 Credits.

Study of the fundamental concepts of tax implications that result from common business transactions. Prereq: ACCT 102 or ACCT 201. Cross-listed with ACCT 318. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 340. International Business. 3 Credits.

Study of international business: ways in which it differs from domestic operations; benefits of operating globally; and political, cultural, and economic problems faced by managers of firms engaged in international activities. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 341. Global Business Environment. 3 Credits.

Introduction to the policies, procedures, and institutions impacting the global business environment, including visits to relevant businesses, institutions, and historical sites. This course is taught exclusively as part of an NDSU study abroad experience. Prereq: acceptance into the NDSU College of Business program in Europe. May be repeated for credit.

BUSN 347. Principles of Real Estate. 3 Credits.

Principles and techniques of real estate appraisals, practical application of appraisal principles, and techniques to real property evaluation. Prereq: Students must be College of Business professional major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with AGECE 347.

BUSN 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

BUSN 380. Business Analytics: Business Problem Solving with Spreadsheets. 3 Credits.

This course explores spreadsheets as a tool for solving business problems. Prereq: restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 383. Organizational Communication I. 3 Credits.

Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure and interpersonal aspects of supervisor-subordinate relations. Prereq: Students must be College of Business professional major or minor and a 2.50 minimum NDSU grade point average. Cross-listed with COMM 383.

BUSN 391. Seminar. 1-3 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 397. Fe/Coop Ed/Internship. 1-4 Credits.**BUSN 399. Special Topics. 1-5 Credits.****BUSN 413. Business Internship. 3 Credits.**

Supervised professional experience with an appropriate public or private business. Students must meet standards established by the employer and the College of Business. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 430. Legal and Social Environment of Business. 3 Credits.

Study of legal and regulatory environment in which business firms operate, as well as the social environment. Includes business ethics and social responsibility issues. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see BUSN 630.}.

BUSN 431. Business Law I-Contracts, Property and Torts. 3 Credits.

A study of the foundations of business law and commercial transactions: the law of contracts, personal property, real estate, insurance, wills and estates, and torts. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 440. International Business Law. 3 Credits.

Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. Prereq: BUSN 430. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see BUSN 640.}.

BUSN 474. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Prereq: ECON 201. Cross-listed with AGECE 474. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see BUSN 674.}.

BUSN 487. Managerial Economics. 3 Credits.

Business managers, entrepreneurs, and other executives make a variety of important decisions on a daily basis. These decisions are broad in scope and vary in the length of time for which they are made, ranging from developing a particular pricing promotion to expanding the size of a major production plant. This course will provide students with a better understanding of the economics of such decisions and provide tools that can be used to make better business decisions. Prereq: MGMT 320, ECON 201, ECON 202, MATH 144 or MATH 146 and restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 489. Strategic Management. 3 Credits.

Analysis of strategic business issues, and integration of business-related knowledge and cross-functional business principles through experiential exercise. Capstone for all College of Business majors. Prereq: FIN 320, MGMT 320, MKT 320. Co-req: BUSN 430.

BUSN 491. Seminar. 1-5 Credits.**BUSN 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 496. Field Experience. 1-15 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 499. Special Topics. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

BUSN 640. International Business Law. 3 Credits.

Study of public and private international law as it relates to international business: international contracts and sales; international business organizations; and international trade, tariffs, and agreements. {Also offered for undergraduate credit - see BUSN 440.}.

BUSN 674. Cooperatives. 3 Credits.

Theory, practice, and evaluation of cooperatives including principles, management, marketing, finance, taxes, legal issues, and adjusting to change. Cross-listed with AGECE 674. F, S, Su. {Also offered for undergraduate credit - see BUSN 474.}.

BUSN 690. Graduate Seminar. 1-3 Credits.

BUSN 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

BUSN 696. Special Topics. 1-5 Credits.

BUSN 790. Graduate Seminar. 1-3 Credits.

BUSN 791. Temporary/Trial Topics. 1-5 Credits.

BUSN 793. Individual Study/Tutorial. 1-5 Credits.

BUSN 794. Practicum/Internship. 1-8 Credits.

BUSN 795. Field Experience. 1-15 Credits.

BUSN 796. Special Topics. 1-5 Credits.

BUSN 797. Master's Paper. 1-3 Credits.

BUSN 798. Master's Thesis. 1-10 Credits.

Cereal & Food Sciences (CFS)

CFS 194. Individual Study. 1-3 Credits.

CFS 196. Field Experience. 1-15 Credits.

CFS 199. Special Topics. 1-5 Credits.

CFS 200. Introduction to Food Systems. 3 Credits.

The fundamentals of food science and food safety will be introduced with emphasis on how food components and processing affect quality and safety of foods.

CFS 210. Introduction to Food Science and Technology. 3 Credits.

Overview of food components, food quality, nutrition, processing, packaging, safety, sanitation laws, sensory evaluation, distribution, and utilization.

CFS 291. Seminar. 1-3 Credits.

CFS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 294. Individual Study. 1-5 Credits.

CFS 299. Special Topics. 1-5 Credits.

CFS 370. Food Processing I. 3 Credits.

This course is designed to provide students with an introduction to food processing methods. The course will provide hands-on experience with a focus on basic food processing methods. Recommended Prereq: CFS 210.

CFS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CFS 391. Seminar. 1-3 Credits.

CFS 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 394. Individual Study. 1-5 Credits.

CFS 397. Fe/Coop Ed/Internship. 1-4 Credits.

CFS 399. Special Topics. 1-5 Credits.

CFS 430. Food Unit Operations. 3 Credits.

Thermodynamics, materials and energy balance, fluid flow, heat transfer, heat exchange, all related to food processing. Prereq: CFS 470 and MATH 146. {Also offered for graduate credit - see CFS 630.}.

CFS 450. Cereal Technology. 3 Credits.

Discussion of cereal grains, their properties, evaluation, and utilization. {Also offered for graduate credit - see CFS 650.}.

CFS 452. Food Laws and Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. {Also offered for graduate credit - see CFS 652.}.

CFS 460. Food Chemistry. 3 Credits.

Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. Recommended Prereq: CFS 210, CHEM 341, CHEM 341L. {Also offered for undergraduate credit - see CFS 660.}.

CFS 461. Food Chemistry Laboratory. 1 Credit.

Laboratory isolation, observation of characteristics, and quantitation of food components. Recommended Coreq: CFS 460. {Also offered for graduate credit - see CFS 661.}.

CFS 462. Food Ingredient Technology. 3 Credits.

The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq or Co-req: CFS 460. {Also offered for graduate credit - See CFS 662.}.

CFS 464. Food Analysis. 3 Credits.

Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 210. {Also offered for graduate credit - see CFS 664.}.

CFS 470. Food Processing II. 3 Credits.

This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. Recommended Prereq: CFS 370. {Also offered for graduate credit - see CFS 670.}.

CFS 471. Food Processing Laboratory. 1 Credit.

Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Recommended Coreq: CFS 470. {Also offered for graduate credit - see CFS 671.}.

CFS 472. Cereal and Food Fermentation. 3 Credits.

This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. Prereq: CFS 370 or MICR 350 or MICR 453. {Also available for graduate credit - See CFS 672.}.

CFS 474. Sensory Science of Foods. 3 Credits.

The science used in the evaluation of flavor, color, and texture of foods. Experiential approaches will be used to evaluate sensory characteristics of foods. Recommended Prereq: STAT 330. {Also offered for graduate credit - see CFS 674.}.

CFS 480. Food Product Development. 3 Credits.

This course is designed to provide students the opportunity to incorporate the basic principles of food science in the theoretical development of food products. (Food Science Capstone) Prereq: CFS 453, CFS 460, CFS 464, CFS 470. {Also offered for graduate credit - see CFS 680.}.

CFS 491. Seminar. 1-5 Credits.**CFS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 494. Individual Study. 1-5 Credits.**CFS 496. Field Experience. 1-15 Credits.****CFS 499. Special Topics. 1-5 Credits.****CFS 630. Food Unit Operations. 3 Credits.**

Thermodynamics, materials and energy balance, fluid flow, heat transfer, heat exchange, all related to food processing. {Also offered for undergraduate credit - see CFS 430.}.

CFS 650. Cereal Technology. 3 Credits.

Discussion of cereal grains, their properties, evaluation, and utilization. {Also offered for undergraduate credit - see CFS 450.}.

CFS 652. Food Laws and Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. Cross-listed with SAFE 652 and AGECE 652. {Also offered for undergraduate credit - see CFS 452.}.

CFS 660. Food Chemistry. 3 Credits.

Study of food components including water, carbohydrates, lipids, proteins, vitamins, minerals, and enzymes. {Also offered for undergraduate credit - see CFS 440.}.

CFS 661. Food Chemistry Laboratory. 1 Credit.

Laboratory isolation, observation of characteristics, and quantitation of food components. Coreq: CFS 660. {Also offered for undergraduate credit - see CFS 461.}.

CFS 662. Food Ingredient Technology. 3 Credits.

The course will present principles and discuss utilization of food ingredients. It provides chemical and physical nature of food ingredients; functions and effects on chemical, rheological, microbiological, and nutritional properties of foods. Distribution and legislation of food ingredients, sources, properties and their applications will be discussed. This course also will shed light on the molecules that constitute our macro and micro nutrients and will attempt to clarify a number of the food issues using the best evidence available. Prereq: CFS 660. {Also available for undergraduate credit - See CFS 462.}.

CFS 664. Food Analysis. 3 Credits.

Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Prereq: CFS 660. {Also offered for undergraduate credit - see CFS 464.}.

CFS 670. Food Processing II. 3 Credits.

This course is designed to provide students with an in-depth academic and practical exposure to food processing methods and the food industry. Concepts in quality control systems and sanitation will be discussed. {Also offered for undergraduate credit - see CFS 470.}.

CFS 671. Food Processing Laboratory. 1 Credit.

Field trips, experiments on freezing, freeze-drying, spray drying, canning, beverage production, water activity measurements, shelf life, and quality control. Coreq: CFS 670. {Also offered for undergraduate credit - see CFS 471.}.

CFS 672. Cereal and Food Fermentation. 3 Credits.

This is an advanced course with a focus on topics in food fermentation. This course will integrate principles of food microbiology, biochemistry, and discussion of food fermentation processing. Areas covered include microorganisms involved in fermentation; dairy, meat, vegetable, cereal grain, fruit and unique fermented foods and their processing, and food safety aspects of fermented foods. {Also available for undergraduate credit - See CFS 472.}.

CFS 674. Sensory Science of Foods. 3 Credits.

The science used in the evaluation of flavor, color, and texture of foods. Experiential approaches will be used to evaluate sensory characteristics of foods. {Also offered for undergraduate credit - see CFS 474.}.

CFS 680. Food Product Development. 3 Credits.

This course is designed to provide students the opportunity to incorporate the basic principles of food science in the theoretical development of food products. {Also offered for undergraduate credit - see CFS 480.}.

CFS 690. Graduate Seminar. 1-3 Credits.**CFS 692. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CFS 695. Field Experience. 1-15 Credits.**CFS 696. Special Topics. 1-5 Credits.****CFS 725. Food Policy. 3 Credits.**

Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGE 725 and SAFE 725.

CFS 758. Fundamentals of Flour Testing and Baking. 3 Credits.

Flour testing, industrial, and experimental bread baking. Production methods, ingredients, and baking reactions. Lectures and laboratories. Prereq: CFS 650.

CFS 759. Milling. 3 Credits.

Experimental and industrial feed and flour milling. Production, equipment, and factors involved in the milling process. Lectures and laboratories. Prereq: CFS 650.

CFS 760. Pasta Processing. 3 Credits.

Durum wheat quality, pasta production, and pasta quality evaluation. Lectures and laboratories. Prereq: CFS 650.

CFS 761. Malting and Brewing. 3 Credits.

Barley and malt quality; malting and brewing. Lectures and laboratories. Prereq: CFS 650.

CFS 764. Carbohydrate Chemistry. 2 Credits.

This course focuses on developing i) knowledge on structural features of carbohydrates and ii) skills for structural characterization of carbohydrates in plants and microorganisms using analytical methods. Recommended prereq: Introductory Chemistry/Biochemistry class.

CFS 765. Advanced Cereal and Food Chemistry I. 4 Credits.

Physiochemical, structural, functional, and analysis of cereal and food carbohydrates and enzymes. Biochemical aspects of these components will also be presented.

CFS 766. Advanced Cereal and Food Chemistry II. 4 Credits.

Physiochemical, structural, and functional properties of cereal and food proteins and lipids in food systems.

CFS 790. Graduate Seminar. 1-3 Credits.**CFS 791. Temporary/Trial Topics. 1-5 Credits.****CFS 792. Graduate Teaching Experience. 1-6 Credits.****CFS 793. Individual Study. 1-5 Credits.****CFS 794. Practicum/Internship. 1-8 Credits.****CFS 795. Field Experience. 1-15 Credits.****CFS 796. Special Topics. 1-5 Credits.****CFS 797. Master's Paper. 1-3 Credits.****CFS 798. Master's Thesis. 1-10 Credits.****CFS 892. Graduate Teaching Experience. 1-6 Credits.****CFS 899. Doctoral Dissertation. 1-15 Credits.**

Chemistry (CHEM)

CHEM 117. Chemical Concepts and Applications. 3 Credits.

Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103, MATH 104 or MATH 107 or Math placement.

CHEM 117L. Chem Concepts and Applications Lab. 1 Credit.

Introduction to general and organic chemistry, with applications drawn from the health, environmental, and materials sciences. Prereq or Coreq: MATH 103, MATH 104, MATH 107 or Math placement.

CHEM 121L. General Chemistry I Laboratory. 1 Credit.

Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 121. General Chemistry I. 3 Credits.

Matter, measurement, atoms, ions, molecules, reactions, chemical calculations, thermochemistry, bonding, molecular geometry, periodicity, and gases. Prereq or Coreq: MATH 103 or MATH 107 or Math placement.

CHEM 122L. General Chemistry II Laboratory. 1 Credit.

Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases, solution chemistry, precipitation, thermodynamics, and electrochemistry. Prereq: CHEM 121L.

CHEM 122. General Chemistry II. 3 Credits.

Intermolecular forces, liquids, solids, kinetics, equilibria, acids and bases, solution chemistry, precipitation, thermodynamics, and electrochemistry. Prereq: CHEM 121.

CHEM 140. Organic Chemical Concepts and Applications. 1 Credit.

Introduction to organic chemistry for pre-nursing and other students who need to meet the prerequisite for CHEM 260.

CHEM 150. Principles of Chemistry I. 3 Credits.

Chemistry for students with good high school preparation in mathematics and science. Electronic structure, stoichiometry, molecular geometry, ionic and covalent bonding, energetics of chemical reactions, gases, transition metal chemistry. Prereq: MATH 103 or MATH 107 or Math placement.

CHEM 151. Principles of Chemistry II. 3 Credits.

Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: CHEM 150.

CHEM 160. Principles of Chemistry Laboratory I. 1 Credit.

Chemistry for students with good high school preparation in mathematics and science. Electronic structure, stoichiometry, molecular geometry, ionic and covalent bonding, energetics of chemical reactions, gases, transition metal chemistry.

CHEM 161. Principles of Chemistry Laboratory II. 1 Credit.

Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Prereq: CHEM 160.

CHEM 194. Individual Study. 1-3 Credits.**CHEM 196. Field Experience. 1-15 Credits.****CHEM 199. Special Topics. 1-5 Credits.****CHEM 240. Survey of Organic Chemistry. 3 Credits.**

Structure and bonding, nomenclature; hydrocarbons: alkanes, alkenes, alkynes, aromatics; substituted hydrocarbons: alkyl halides, stereochemistry, alcohols, phenols, ethers, amines; carbonyls: aldehydes, ketones; carboxylic acids, esters, amides. Prereq: CHEM 121.

CHEM 291. Seminar. 1-3 Credits.**CHEM 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 294. Individual Study. 1-5 Credits.**CHEM 299. Special Topics. 1-5 Credits.****CHEM 341L. Organic Chemistry I Laboratory. 1 Credit.**

First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122L or CHEM 161.

CHEM 341. Organic Chemistry I. 3 Credits.

First semester of a two-semester course in organic chemistry for students in sciences and pre-professional curricula. Prereq: CHEM 122 or CHEM 151.

CHEM 342L. Organic Chemistry II Laboratory. 1 Credit.

Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 341L.

CHEM 342. Organic Chemistry II. 3 Credits.

Structure and reactivity, named reactions, carbon-carbon bond forming reactions, aromatic and heterocyclic chemistry, biomolecules and polymers, and multi-step synthesis. Prereq: CHEM 240 or CHEM 341.

CHEM 353. Majors Organic Chemistry Laboratory I. 1 Credit.

Organic functional group synthesis. Modern analytical tools for functional group analysis and structure determination. Coreq: CHEM 341.

CHEM 354. Majors Organic Chemistry Laboratory II. 2 Credits.

More advanced aspects of organic laboratory operations, synthesis, analysis, and structure determination using spectroscopic techniques. Coreq: CHEM 342.

CHEM 364. Physical Chemistry I. 3 Credits.

Mathematical and physical basis of chemical phenomena. Emphasis on quantum chemistry and spectroscopy. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265, PHYS 252.

CHEM 365. Physical Chemistry II. 3 Credits.

Mathematical and physical basis of chemical phenomena. Emphasis on chemical thermodynamics. Prereq: CHEM 122 or CHEM 151, MATH 259 or MATH 265 and PHYS 252.

CHEM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHEM 380. Chemistry Junior Seminar. 1 Credit.

Includes discussion of chemistry topics, technical writing instruction and assignments; participation in senior seminar discussions.

CHEM 391. Seminar. 1-3 Credits.**CHEM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 394. Individual Study. 1-5 Credits.**CHEM 397. Fe/Coop Ed/Internship. 1-4 Credits.****CHEM 399. Special Topics. 1-5 Credits.****CHEM 425. Inorganic Chemistry I. 3 Credits.**

Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. Prereq: CHEM 364. {Also offered for graduate credit - see CHEM 625.}.

CHEM 426. Crystallography/Crystal Chemistry. 2 Credits.

Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for graduate credit - see CHEM 626.}.

CHEM 427. X-Ray Diffraction. 2 Credits.

Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for graduate credit - see CHEM 627.}.

CHEM 428. Geochemistry. 3 Credits.

Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with GEOL 428. (alternate years) {Also offered for undergraduate credit - see CHEM 628.}.

CHEM 429. Inorganic Chemistry Laboratory. 2 Credits.

Methods of synthesis and characterization of inorganic and organometallic compounds. Prereq: CHEM 354, CHEM 431 L. Coreq: CHEM 425.

CHEM 431. Analytical Chemistry I. 3 Credits.

Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122 or CHEM 151, CHEM 122L or CHEM 161 and CHEM 342.

CHEM 431L. Analytical Chemistry I Laboratory. 2 Credits.

Chemical equilibrium and its analytical applications; introduction to chromatography and potentiometry. Prereq: CHEM 122L or CHEM 161.

CHEM 432L. Analytical Chemistry II Laboratory. 1 Credit.

Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: CHEM 431 L. {Also offered for graduate credit - see CHEM 632L.}.

CHEM 432. Analytical Chemistry II. 3 Credits.

Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: CHEM 431. {Also offered for graduate credit - see CHEM 632.}.

CHEM 435. Chemical History. 2 Credits.

Survey of the history of the chemical sciences from the stone-age through the early 1900s. Prereq: CHEM 341. {Also offered for graduate credit - see CHEM 635.}.

CHEM 436. Biopolymers and Biocomposites. 3 Credits.

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CPM 436 and ME 436. {Also offered for graduate credit - See CHEM 636.}.

CHEM 465. Survey of Physical Chemistry. 4 Credits.

Conceptual approach to physical chemistry including thermodynamics, kinetics, and quantum mechanics. Application of fundamental concepts to the life sciences. 4 lectures. Prereq: MATH 147 or MATH 166 and PHYS 212. {Also offered for graduate credit - see CHEM 665.}.

CHEM 471. Physical Chemistry Laboratory. 2 Credits.

Measurement of thermodynamic and spectroscopic properties of chemical substances, analysis of data. Prereq: CHEM 364.

CHEM 472. Surface Chemistry. 2 Credits.

The object of the course is to enhance the knowledge of experimental and computational techniques in a sub area of physical chemistry. {Also offered for graduate credit - see CHEM 672.}.

CHEM 476. Introduction to Computational Quantum Chemistry. 3 Credits.

This is a mathematically non-rigorous introduction to procedures and capabilities of basic computational quantum chemistry with practical aspects on using common computational chemistry software. Recommended: CHEM 364, CHEM 365. {Also offered for graduate credit - see CHEM 676.}.

CHEM 491. Seminar. 1-5 Credits.**CHEM 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CHEM 493. Undergraduate Research. 1-5 Credits.**CHEM 494. Individual Study. 1-5 Credits.****CHEM 496. Field Experience. 1-15 Credits.****CHEM 499. Special Topics. 1-5 Credits.****CHEM 625. Inorganic Chemistry I. 3 Credits.**

Electronic structure, ionic and covalent structure and bonding, point groups and symmetry, coordination chemistry, acid-base and redox chemistry. {Also offered for undergraduate credit - see Chem 425.}.

CHEM 626. Crystallography/Crystal Chemistry. 2 Credits.

Geometric and space group crystallography. Structure and bonding in common minerals and industrially important solids. Structure-property relationships. Half semester. {Also offered for undergraduate credit - see CHEM 426.}.

CHEM 627. X-Ray Diffraction. 2 Credits.

Analytical X-ray powder diffraction for qualitative and quantitative analysis of crystalline solids. Crystal structure analysis using powder methods. Introduction to X-ray fluorescence spectrometry. Half semester. {Also offered for undergraduate credit - see CHEM 427.}.

CHEM 628. Geochemistry. 3 Credits.

Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Cross-listed with GEOL 628. (alternate years) {Also offered for undergraduate credit - see CHEM 428.}.

CHEM 632L. Analytical Chemistry II Laboratory. 1 Credit.

Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. {Also offered for undergraduate credit - see CHEM 432L.}.

CHEM 632. Analytical Chemistry II. 3 Credits.

Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. {Also offered for undergraduate credit - see CHEM 432.}.

CHEM 635. Chemical History. 2 Credits.

Survey of the history of the chemical sciences from the stone-age through the early 1900's. {Also offered for undergraduate credit - see CHEM 435.}.

CHEM 636. Biopolymers and Biocomposites. 3 Credits.

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CPM 636 and ME 636. {Also offered for undergraduate credit - See CHEM 436.}.

CHEM 665. Survey of Physical Chemistry. 4 Credits.

Conceptual approach to physical chemistry including thermodynamics, kinetics, and quantum mechanics. Application of fundamental concepts to the life sciences. 4 lectures. {Also offered for undergraduate credit - see CHEM 465.}.

CHEM 672. Surface Chemistry. 2 Credits.

The object of the course is to enhance the knowledge of experimental and computational techniques in a sub area of physical chemistry. {Also offered for undergraduate credit - see CHEM 472.}.

CHEM 676. Introduction to Computational Quantum Chemistry. 3 Credits.

This is a mathematically non-rigorous introduction to procedures and capabilities of basic computational quantum chemistry with practical aspects on using common computational chemistry software. {Also offered for undergraduate credit - see CHEM 476.}.

CHEM 690. Graduate Seminar. 1-3 Credits.**CHEM 696. Special Topics. 1-5 Credits.****CHEM 720. Introduction to Chemical Research. 2 Credits.**

This course will serve as an introduction to research in the molecular sciences, with the goal to prepare graduate students for a successful graduate research experience and for a future research career in the molecular sciences.

CHEM 724. Chemical Applications of Group Theory. 1 Credit.

Symmetry, point groups, basic theory of mathematical groups, application of group theory to chemical bonding and spectroscopy.

CHEM 725. Advanced Survey of Inorganic Chemistry. 4 Credits.

This course is an advanced survey course in Inorganic Chemistry. It emphasizes structure, electronic and magnetic properties, bonding, and symmetry of inorganic compounds, including organometallic and coordination complexes, and their reactivities. Topics also include main-group chemistry, solid-state materials, Lewis acid-base chemistry, oxidation-reduction reactions, and an introduction to physical methods used to probe the properties and track reactions of inorganic compounds.

CHEM 726. Photochemistry and Photophysics. 4 Credits.

Fundamental principles in photochemistry and photophysics, rules for electronic transitions, energy transfer, electron transfer, photochemical reactions of organic chromophores (carbonyls, alkenes, enones, aromatics), singlet oxygen, photochemistry in organized and constrained media, organic solid state photochemistry, instrumental methods in photophysics, application of photochemistry. Prereq: CHEM 625, CHEM 724.

CHEM 727. Organometallic Chemistry. 3 Credits.

Synthesis, reactivity, and bonding in organometallic compounds. Prereq: CHEM 425 or CHEM 625.

CHEM 728. Physical Methods for Chemical and Biomolecular Research. 2 Credits.

Fundamentals and applications of physical methodologies, with emphasis on spectroscopic methods, used to probe molecular structure and the structural basis of reactivity. Covers optical, chiroptical, vibrational, paramagnetic resonance, and nuclear spectroscopic methods along with their applications to the study of molecular and biomolecular systems. Prereq: CHEM 625 or BIOC 665.

CHEM 729. X-Ray Structure Determination. 2 Credits.

Use of single crystal X-ray diffraction data to determine molecular and crystal structures. Half semester.

CHEM 730. Separations. 2 Credits.

Theory of equilibrium chemistry in aqueous and nonaqueous systems; principles of chromatographic and other separation techniques. Prereq: CHEM 632.

CHEM 732. Advanced Survey of Analytical Chemistry. 4 Credits.

Theoretical basis and application of several modern chemical analysis techniques. The focus will be the application of electrochemistry, chromatography, electrophoresis, and mass spectrometry in the chemical and biochemical analysis.

CHEM 734. Instrumentation Electronics. 5 Credits.

Design and operation of digital and analog circuits used in chemical instrumentation, computer interfacing. Includes laboratory. Prereq: CHEM 632.

CHEM 736. Mass Spectrometry. 2 Credits.

Theory and application of mass spectrometry in analysis, tandem mass spectrometry, ionization techniques. Half semester. Prereq: CHEM 632.

CHEM 741. Physical Organic Chemistry I. 4 Credits.

Principles governing the reactivity of organic compounds and methods for determining reaction mechanisms.

CHEM 742. Physical Organic Chemistry II. 2 Credits.

Aromaticity, electrophilic substitution, Woodward-Hoffman rules. Half semester. Prereq: CHEM 741.

CHEM 743. Reactive Intermediates. 2 Credits.

Radicals, carbenes, nitrenes, arynes, carbenium ions, survey of other reactive intermediates. Half semester. Prereq: CHEM 741.

CHEM 744. Organic Spectroscopy. 2 Credits.

Structure elucidation by spectrometric methods, including infrared, mass spectrometry, UV, and nuclear magnetic resonance. Interpretation of 2-D NMR spectra. Half semester.

CHEM 745. Organic Synthesis. 4 Credits.

Functional group synthesis, synthetic design, stereochemical control. Prereq: CHEM 741.

CHEM 746. Advanced NMR Spectrometry. 2 Credits.

Theory of pulsed FT-NMR, instrumentation, pulse sequences (with emphasis on multipulse experiments), two-dimensional NMR and applications. Half semester. Prereq: CHEM 744.

CHEM 747. Heterocycles. 2 Credits.

Synthesis of heterocycles, aromaticity, organometallic chemistry, nucleosides, natural products. Prereq: CHEM 745.

CHEM 748. Total Synthesis of Natural Products. 2 Credits.

Retrosynthetic analysis, total synthesis, terpenes, alkaloids will be studied. Prereq: CHEM 745.

CHEM 754. Organic Spectroscopy Laboratory. 1 Credit.

Laboratory to accompany 744, with emphasis on NMR techniques. Half semester. Coreq: CHEM 744.

CHEM 759. Advanced Survey of Physical Chemistry. 4 Credits.

Fundamental principles of physical chemistry including quantum chemistry, spectroscopy, molecular thermodynamics, and kinetics.

CHEM 760. Statistical Thermodynamics. 4 Credits.

Macroscopic and microscopic models for the study of equilibrium properties of pure phases and solutions.

CHEM 761. Optical Spectroscopy. 2 Credits.

Theory and practice of modern spectroscopic methods. Emphasis on visible and ultraviolet wavelength ranges. Half semester. Prereq: CHEM 632.

CHEM 763. Kinetics. 2 Credits.

Experimental methods to determine reaction rates, empirical rate laws, transition state theory. Half semester.

CHEM 764. Dynamics. 2 Credits.

Chemical physics of energy transfer and reactive collisions. Half semester. Prereq: CHEM 763.

CHEM 766. Quantum Chemistry I. 4 Credits.

Wave functions and their properties, quantum mechanical behavior of atoms and molecules.

CHEM 767. Quantum Chemistry II. 2 Credits.

Ab initio and semi-empirical methods for the calculation of energetic and structural properties of molecules; computational methods. Half semester. Prereq: CHEM 766.

CHEM 790. Graduate Seminar. 1-3 Credits.

CHEM 791. Temporary/Trial Topics. 1-5 Credits.

CHEM 793. Individual Study/Tutorial. 1-5 Credits.

CHEM 794. Practicum. 1-10 Credits.

CHEM 795. Field Experience. 1-15 Credits.

CHEM 796. Special Topics. 1-5 Credits.

CHEM 797. Master's Paper. 1-3 Credits.

CHEM 798. Master's Thesis. 1-10 Credits.

CHEM 890. Seminar. 1-5 Credits.

CHEM 892. Graduate Teaching Experience. 1-6 Credits.

CHEM 899. Doctoral Dissertation. 1-15 Credits.

Civil Engineering (CE)

CE 111. Introduction to Civil Engineering. 1 Credit.

This course is designed to introduce students to the field of civil engineering and to review the disciplines and types of jobs within the field. It also introduces the student to the roles and duties of a professional engineer. Students also work in groups on design projects to illustrate the steps involved in the design-build process.

CE 112. Computer Applications in Civil Engineering. 1 Credit.

This course is designed to introduce students to the use of spreadsheet software, engineering applications, data analysis and basic programming methods to solve civil engineering problems.

CE 194. Individual Study. 1-3 Credits.

CE 196. Field Experience. 1-15 Credits.

CE 199. Special Topics. 1-5 Credits.

CE 204. Surveying. 3 Credits.

Measurements and errors; topographical and construction surveys; vertical and horizontal control methods; field exercises and computation techniques for surveying data; computation of earthwork volumes. 2 one-hour lectures, 1 three-hour laboratory. Prereq: MATH 105.

CE 212. Civil Engineering Graphic Communications. 3 Credits.

Integrating manual drafting and computer-aided drafting/design in one course with emphases on civil engineering practices.

CE 291. Seminar. 1-3 Credits.

CE 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 294. Individual Study. 1-5 Credits.

CE 299. Special Topics. 1-5 Credits.

CE 303L. Civil Engineering Materials Laboratory. 1 Credit.

Tests for evaluating raw materials and mix designs of different types of bituminous materials and Portland cement concrete. 1 three-hour laboratory. Prereq: ME 223. Co-req: CE 303, F, S.

CE 303. Civil Engineering Materials. 2 Credits.

Physical, mechanical and chemical properties of different types of bituminous materials and Portland cement concrete; industry standards for evaluating raw materials and mix designs. 2 one-hour lectures. Prereq: ME 223. F, S.

CE 309. Fluid Mechanics. 3 Credits.

Statics, kinematics, and dynamics of fluid flow; momentum and energy concepts; flow through pipes; uniform flow in open channels; pumps and measurement of flow. 3 one-hour lectures. Prereq: ME 222. F, S.

CE 310. Fluid Mechanics Laboratory. 1 Credit.

Visualization and verification of the concepts of fluid flow, pumps, turbines, and flow meters. 1 two-hour laboratory. Prereq: CE 309. F, S.

CE 316. Soil Mechanics. 3 Credits.

Principles of soil mechanics including three-phase composition, classification, effective stress, consolidation, shear strength, compaction, and site investigation. 2 lectures, 1 two-hour laboratory. Prereq: ME 222, ME 223. Co-req or Prereq: MATH 266.

CE 343. Structural Engineering and Analysis. 4 Credits.

Structural loading and analysis of statically determinate and indeterminate structures. Covers the elastic analysis and deformations of trusses, beams, and frames using force methods, displacement methods, matrix methods, and moment distribution. Prereq: ME 223.

CE 370. Introduction to Environmental Engineering. 3 Credits.

Introduction to various municipal and industrial pollutants being introduced into water, air, and land systems and their effects on the environment. Application of chemical, physical, and biological principles to the management of these pollutants. 3 one-hour lectures. Prereq: CE 309, CHEM 122.

CE 371. Environmental Engineering Laboratory. 1 Credit.

Water, wastewater, and solid waste analyses regarding their theory, objectives, and practices. Exposure to practical applications of the scientific and design theories presented in CE 370. 1 three-hour laboratory. Co-req: CE 370.

CE 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CE 391. Seminar. 1-3 Credits.**CE 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 394. Individual Study. 1-5 Credits.**CE 397. Fe/Coop Ed/Internship. 1-4 Credits.****CE 399. Special Topics. 1-5 Credits.****CE 403. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.**

Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. Prereq: CE 303. {Also offered for graduate credit - see CE 603.}.

CE 404. Reinforced Concrete. 3 Credits.

Principles of design and analysis of reinforced concrete members, flexural and shear design of rectangular and tee beams, serviceability criteria, short and slender columns. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F, S.

CE 405. Advanced Reinforced Concrete. 2 Credits.

Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. Prereq: CE 404. F, S {Also offered for graduate credit - see CE 605.}.

CE 408. Water Resources and Supply. 3 Credits.

Hydrologic concepts, development of water supply sources, principles involved in the collection and transportation of water/wastewater/storm runoff, and distribution of water for municipal use. Prereq: CE 309. F, S.

CE 410. Water and Wastewater Engineering. 3 Credits.

Principles involved in treatment, disposal, reuse, and recycling of municipal water supplies and wastewaters. Laboratory introduces tests to evaluate treatment requirements and effectiveness. 3 one-hour lectures, 1 three-hour laboratory. Prereq: CE 370. {Also offered for graduate credit - see CE 610.}.

CE 411. Design of Pre-stressed Concrete. 2 Credits.

Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. Prereq: CE 404. S {Also offered for graduate credit - see CE 611.}.

CE 417. Slope Stability and Retaining Walls. 3 Credits.

Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes. Prereq: CE 316. S {Also offered for graduate credit - see CE 617.}.

CE 418. Transportation Engineering. 4 Credits.

Location, analysis, modeling, and design of multi-modal facilities including highways, railways, airports, terminals, harbors, ports, canals, waterways, pipelines, and conveyor systems. 3 one-hour lectures, 1 two-hour session. Prereq: CE 204, ME 221, MATH 259.

CE 419. Pavement Design. 3 Credits.

Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. Co-req: CE 303. {Also offered for graduate credit - see CE 619.}.

CE 421. Open Channel Flow. 3 Credits.

Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. Prereq: CE 309. S {Also offered for graduate credit - see CE 621.}.

CE 425. Bridge Evaluation and Rehabilitation. 3 Credits.

Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. Prereq: CE 343 and CE 404. {Also offered for graduate credit - see CE 625.}.

CE 430. Timber and Form Design. 3 Credits.

Analysis and design of wood structures and concrete formwork. 2 seventy-five minute lectures. Prereq: ME 223.

CE 441. Finite Element Analysis. 3 Credits.

Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. Prereq: CE 343. {Also offered for graduate credit - see CE 641.}.

CE 442. Matrix Analysis of Structures. 2 Credits.

Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. Prereq: CE 343. F, S {Also offered for graduate credit - see CE 642.}.

CE 444. Structural Steel Design. 3 Credits.

Design of metal structures including mechanical behavior of metals; behavior and proportioning of tension and compression members; beams, beam columns, and connections; selection of metal structural systems. 2 one-hour lectures, 1 two-hour session. Prereq: CE 343. F.

CE 445. Advanced Steel Design. 2 Credits.

Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. Prereq: CE 444. S {Also offered for graduate credit - see CE 645.}.

CE 446. Basic Dynamics of Structures. 3 Credits.

Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. Prereq: CE 343. F {Also offered for graduate credit - see CE 646.}.

CE 447. Stability of Structures. 3 Credits.

Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. Prereq: CE 343. {Also offered for graduate credit - see CE 647.}.

CE 452. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.

This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. Prereq: CE 418. {Also offered for graduate credit - see CE 652.}.

CE 454. Geometric Highway Design. 3 Credits.

Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. Prereq: CE 418. F {Also offered for graduate credit - see CE 654.}.

CE 455. Airport Planning and Design. 2 Credits.

System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 655.}.

CE 456. Railroad Planning and Design. 3 Credits.

Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. Prereq: CE 418. F {Also offered for graduate credit - see CE 656.}.

CE 457. Pavement Management Systems. 2 Credits.

Pavement design, maintenance, and rehabilitation strategies; planning, budgeting, and programming for pavement management at network and project levels; development, design, and maintenance of pavement management systems. 2 one-hour lectures. Prereq: CE 303.

CE 458. Bituminous Materials and Mix. 3 Credits.

This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. Prereq: CE 303 {Also offered for graduate credit - see CE 658.}.

CE 461. Foundation Engineering. 3 Credits.

Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. Prereq: CE 316. F {Also offered for graduate credit - see CE 661.}.

CE 462. Designing with Geosynthetics. 2 Credits.

Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. Prereq: CE 316. S {Also offered for graduate credit - see CE 662.}.

CE 463. Geotechnical Earthquake Engineering. 3 Credits.

Wave propagation in soils, dynamic properties of soils, cyclic stress-strain behavior of soils, ground response analysis, liquefaction, soil-structure interaction, seismic design of foundations, retaining walls, and seismic slope stability analysis. Prereq: CE 316. {Also offered for graduate credit - see CE 663.}.

CE 464. Advanced Soil Mechanics. 2 Credits.

This course introduces the students to advanced topics in soil mechanics, 1) unsaturated soil mechanics and 2) molecular modeling of clay-fluid interactions, for the design of foundations, retaining walls and slopes for realistic soil moisture conditions. Prereq: CE 316. {Also offered for graduate credit - see CE 664.}.

CE 471. Environmental Nanotechnology. 3 Credits.

This course introduces nanotechnology with special emphasis on environmental science and engineering. Applications and environmental implications of nanotechnology will be discussed from a national and global perspective. Prereq: CE 370 for CE majors and ENVE 360 for ENVE majors. {Also offered for graduate credit - see CE 671.}.

CE 472. Solid Waste Management. 3 Credits.

Basic study of solid waste materials, current collection methods, available disposal techniques, recycling and resource conservation, and economics of solid waste collection and disposal. 3 one-hour lectures. Prereq: CE 370. {Also offered for graduate credit - see CE 672.}.

CE 473. Air Pollution. 3 Credits.

Fundamentals of air pollution and its control technology. Types and sources of air pollutants, meteorology, effects on plants, animals, people, and property. Design of control equipment. 3 one-hour lectures, 1 three-hour laboratory. Prereq: CE 370. S {Also offered for graduate credit - see CE 673.}.

CE 474. Groundwater Sustainability Design. 3 Credits.

To study groundwater flow using mathematical, field, and computational methods; to become prepared to design solutions to North Dakota and international groundwater sustainability challenges. Prereq: CE 309. {Also offered for graduate credit - See CE 674.}.

CE 476. Watershed Modeling. 3 Credits.

Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. Prereq: CE 408. {Also offered for graduate credit - see CE 676.}.

CE 477. Applied Hydrology. 3 Credits.

Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. Prereq: CE 408. F {Also offered for graduate credit - see CE 677.}.

CE 478. Water Quality Management. 3 Credits.

Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. Prereq: CE 370 for CE students and ENVE 360 for ENVE students. {Also offered for graduate credit - see CE 678.}.

CE 479. Advanced Water and Wastewater Treatment. 3 Credits.

Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. Prereq: CE 370 and CE 410 for CE majors or ENVE 412 for ENVE majors. {Also offered for graduate credit - see CE 679.}.

CE 483. Contracts and Specifications. 3 Credits.

Formation, interpretation, and termination of engineering contracts. Engineering specifications and drawings. Other legal matters of concern to engineers. 2 one-hour lectures. Prereq: Junior or Senior standing.

CE 486. Nanotechnology and Nanomaterials. 3 Credits.

This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Prereq: Senior standing in Engineering or Sciences. Cross-listed with ME 486. {Also offered for graduate credit - see CE 686.}.

CE 489. Senior Design. 3 Credits.

An open-ended capstone design project encompassing a number of civil engineering disciplines. Management, business, public policy, and leadership concepts. Importance of professional licensure. 3 one-hour lectures. Prereq: Senior standing. F, S.

CE 491. Seminar. 1-5 Credits.**CE 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CE 493. Undergraduate Research. 1-5 Credits.**CE 494. Individual Study. 1-5 Credits.****CE 496. Field Experience. 1-15 Credits.****CE 499. Special Topics. 1-5 Credits.****CE 603. Civil Engineering Materials II: Steel, Wood and Polymers. 2 Credits.**

Composition, properties, structure, and behavior of steel, wood, and polymeric materials; elastic, plastic, and viscous behavior under various environmental and loading conditions. {Also offered for undergraduate credit - see CE 403.}.

CE 605. Advanced Reinforced Concrete. 2 Credits.

Development and anchorage of reinforcement, details of reinforcement in flexural members, continuous beams and one-way slabs, slender columns, two-way slabs. 1 one-hour lecture, 1 two-hour session. F, S {Also offered for undergraduate credit - see CE 405.}.

CE 610. Water & Wastewater Engineering. 3 Credits.

Principles involved in treatment, disposal, reuse, and recycling of municipal water supplies and wastewaters. Laboratory introduces tests to evaluate treatment requirements and effectiveness. 3 one-hour lectures, 1 three-hour laboratory. F {Also offered for undergraduate credit - see CE 410.}.

CE 611. Design of Pre-stressed Concrete. 2 Credits.

Theory and design of pre-stressed concrete structures, pre- and post-tensioning, loss of pre-stress, proportioning of flexural members, deflections. 2 one-hour lectures. S {Also offered for undergraduate credit - see CE 411.}.

CE 617. Slope Stability and Retaining Walls. 3 Credits.

Performance and design of retaining walls, sheet pile walls, braced walls, and reinforced earth. Also evaluation and mitigation of unstable earth slopes. S {Also offered for undergraduate credit - see CE 417.}.

CE 619. Pavement Design. 3 Credits.

Design of flexible and rigid pavements including sub-grade, base courses, surface courses; evaluation criteria including soil, climate, traffic, material, drainage; initial and maintenance cost considerations; construction practices. 3 one-hour lectures. {Also offered for undergraduate credit - see CE 419.}.

CE 621. Open Channel Flow. 3 Credits.

Geometric and hydraulic properties of open channels, continuity, momentum and energy principles, design of channels, gradually varied flow, critical flow and culvert design. 3 one-hour lectures. S {Also offered for undergraduate credit - see CE 421.}.

CE 625. Bridge Evaluation and Rehabilitation. 3 Credits.

Topics include bridge evaluation methodologies, review of bridge codes, behavior of constructed bridges, sources of bridge deterioration, rehabilitation design with advanced composite materials, structural health monitoring. {Also offered for undergraduate credit - see CE 425.}.

CE 630. Timber and Form Design. 3 Credits.

Analysis and design of wood structures and concrete formwork. 2 seventy-five minute lectures. {Also offered for undergraduate credit - see CE 430.}.

CE 641. Finite Element Analysis. 3 Credits.

Weak and strong solutions to governing differential equations in bars, boundary conditions, Galerkin approximation, nodal basis functions, shape functions. Beam and two-dimensional problems with triangular and quadrilateral elements. F, S {Also offered for undergraduate credit - see CE 441.}.

CE 642. Matrix Analysis of Structures. 2 Credits.

Review of matrix algebra, flexibility and stiffness methods, direct stiffness method, introduction to finite element analysis. 2 lectures. F, S {Also offered for undergraduate credit - see CE 442.}.

CE 645. Advanced Steel Design. 2 Credits.

Analysis and design of metal structures including connections, selection of structural systems. 1 one-hour lecture, 1 two-hour session. S {Also offered for undergraduate credit - see CE 445.}.

CE 646. Basic Dynamics of Structures. 3 Credits.

Analysis of single degree of freedom structural systems to harmonic and general dynamic loading, free vibration of multiple degree of freedom systems, modal superposition, earthquake engineering. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 446.}.

CE 647. Stability of Structures. 3 Credits.

Concepts of stability of equilibrium; stability criteria, work, energy and variational methods; elastic buckling of columns, beams, frames, and plates; FE implementations of stability; design of locally unstable sections. {Also offered for undergraduate credit - see CE 447.}.

CE 652. Fundamentals of Oil & Gas Pipeline: Design, Operation, Inspection & Maintenance. 3 Credits.

This course introduces the fundamentals to design, operate, inspect, and maintain oil & gas pipelines, including basics for pipeline materials, design, network, construction, measuring and detection technology, maintenance, and repair. {Also offered for undergraduate credit - see CE 452.}.

CE 654. Geometric Highway Design. 3 Credits.

Location and design of highways and streets; design controls, elements of design; cross-section design; design of intersections, interchanges, safety appurtenances, and 3R projects. 2 one-hour lectures, 1 two-hour session. F {Also offered for undergraduate credit - see CE 454.}.

CE 655. Airport Planning and Design. 2 Credits.

System planning and demand forecasting; siting and configuration of airports; aircraft characteristics; air traffic controls; standards for geometric design, pavement design, drainage and safety. 2 one-hour lectures. F {Also offered for undergraduate credit - see CE 455.}.

CE 656. Railroad Planning and Design. 3 Credits.

Rail planning and location analysis, track/rail structure, track layout and control system, locomotives and train resistance, track safety standards and geometrics, terminal design. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 456.}.

CE 658. Bituminous Materials and Mix. 3 Credits.

This course presents fundamental knowledge of asphalt material properties, performance requirements, specifications and related test characteristics. {Also offered for undergraduate credit - see CE 458.}.

CE 661. Foundation Engineering. 3 Credits.

Performance and selection of the following foundations: shallow, mat, combined pile, and drilled piers. 3 one-hour lectures. F {Also offered for undergraduate credit - see CE 461.}.

CE 662. Designing with Geosynthetics. 2 Credits.

Theories, principles, and engineering design using geosynthetic materials for a variety of civil engineering applications. Applications to geotechnical, environmental, transportation, and water resources fields are emphasized. Includes construction issues. S {Also offered for undergraduate credit - see CE 462.}.

CE 663. Geotechnical Earthquake Engineering. 3 Credits.

Wave propagation in soils, dynamic properties of soils, cyclic stress-strain behavior of soils, ground response analysis, liquefaction, soil-structure interaction, seismic design of foundations, retaining walls, and seismic slope stability analysis. {Also offered for undergraduate credit - see CE 463.}.

CE 664. Advanced Soil Mechanics. 2 Credits.

This course introduces the students to advanced topics in soil mechanics, 1) unsaturated soil mechanics and 2) molecular modeling of clay-fluid interactions, for the design of foundations, retaining walls and slopes for realistic soil moisture conditions. {Also offered for undergraduate credit - see CE 464.}.

CE 671. Environmental Nanotechnology. 3 Credits.

This course introduces nanotechnology with special emphasis on environmental science and engineering. Applications and environmental implications of nanotechnology will be discussed from a national and global perspective. {Also offered for undergraduate credit - see CE 471.}.

CE 672. Solid Waste Management. 3 Credits.

Basic study of solid waste materials, current collection methods, available disposal techniques, recycling and resource conservation, and economics of solid waste collection and disposal. 3 one-hour lectures. {Also offered for undergraduate credit - see CE 472.}.

CE 673. Air Pollution. 3 Credits.

Fundamentals of air pollution and its control technology. Types and sources of air pollutants, meteorology, effects on plants, animals, people, and property. Design of control equipment. 3 one-hour lectures, 1 three-hour laboratory. S {Also offered for undergraduate credit - see CE 473.}.

CE 674. Groundwater Sustainability Design. 3 Credits.

To study groundwater flow using mathematical, field, and computational methods; to become prepared to design solutions to North Dakota and international groundwater sustainability challenges. {Also offered for undergraduate credit - See CE 474.}.

CE 676. Watershed Modeling. 3 Credits.

Concepts of watershed, watershed hydrology, application of GIS tools, DEM-based watershed delineation, watershed hydrologic modeling, state-of-the-art watershed modeling software, and hands-on applications. {Also offered for undergraduate credit - see CE 476.}.

CE 677. Applied Hydrology. 3 Credits.

Scope of hydrology, hydrologic cycle and components, runoff volume and peak flow estimation, hydrograph analysis, probabilistic concepts in water resources, flood- frequency analysis, application of risk concepts to hydrological design, flow estimation for ungaged watersheds. Two 75-minute lectures. F {Also offered for undergraduate credit - see CE 477.}.

CE 678. Water Quality Management. 3 Credits.

Physical, chemical, biological, hydrological characteristics, and hydrodynamic elements of receiving waters. Characterizations, measurement, and modeling methods of river/streams, lakes/reservoirs, and groundwater systems. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 478.}.

CE 679. Advanced Water and Wastewater Treatment. 3 Credits.

Selected problems in the investigation and design of sewerage systems, water distribution systems, wastewater treatment plants, and water purification plants. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 479.}.

CE 686. Nanotechnology and Nanomaterials. 3 Credits.

This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Cross-listed with ME 686. {Also offered for undergraduate credit - see CE 486.}.

CE 690. Graduate Seminar. 1-3 Credits.**CE 695. Field Experience. 1-15 Credits.****CE 696. Special Topics. 1-5 Credits.****CE 701. Theory of Elasticity. 2 Credits.**

Theoretical and applied study of the classical theories of plates and shells as they pertain to engineering problems including small displacement of rectangular and circular plates and thin shells. 2 one-hour lectures.

CE 702. Plates and Shells. 2 Credits.

A theoretical study of linear elasticity, Saint Venant's problems, plain stress, plain strain, strain energy, and torsion. 2 one-hour lectures.

CE 706. Plastic Design in Structural Steel. 2 Credits.

Inelastic bending of beams and frames, application of upper and lower bound theorems, calculation of deflection, effect of axial and shearing forces on flexural strength, connections, structural safety, and rules of plastic design. 2 one-hour lectures.

CE 709. Dynamics of Structures and Foundations. 2 Credits.

Advanced topics in structural dynamics, frequency domain response, generalized coordinates, nonlinear structural response, dynamic analysis of framed structures, structures with distributed properties, seismic design considerations. 2 one-hour lectures.

CE 714. Theory of Elastic Stability. 2 Credits.

Bending of beams under simultaneous action of axial and lateral loads, buckling of compressed bars in both the elastic and plastic ranges, design formulas, lateral buckling of beams. 2 one-hour lectures.

CE 720. Continuum Mechanics. 3 Credits.

Tensor analysis in affine and metric spaces, kinematics of motion, general principles of continuum mechanics, thermodynamics of deformation, and postulates on constitutive laws. 3 one-hour lectures. Cross-listed with ME 720. F.

CE 725. Biomaterials-Materials in Biomedical Engineering. 3 Credits.

This course covers the fundamentals of synthesis, properties, and biocompatibility of metallic, ceramic, polymeric and composite materials that are designed for replacement of biological materials such as hard and soft tissues.

CE 738. Deep Learning for Engineers. 3 Credits.

This is an introductory course for Deep learning. The students will become familiar with the mathematical background, applications, and limitations of popularly used deep neural network architectures for supervised deep learning tasks. Students will be expected to write codes in standard programming languages. Students without programming experience will be given directed readings and tutorials to cope up with the coding part of this course. Prereq: ENGR 729 Machine Learning for Engineers is the prerequisite for this course. Alternatively, graduate students in any department with good mathematical/ coding/ AI background can request the instructor to waive the prerequisite.

CE 739. Computational Methods for Engineering. 3 Credits.

This course introduces computational methods for graduate students with special emphasis on computational mechanics. Computational methods using High-Performance Computing techniques will be discussed for a wide range of applications. Success in this course requires preexisting familiarity with elementary techniques for solving elementary differential equations. Permission of instructor is required for enrollment.

CE 757. Pavement Evaluation and Rehabilitation. 3 Credits.

Advanced knowledge of pavement performance; pavement evaluation; implementation of pavement management at network and project level; maintenance and rehabilitation strategies; life-cycle-cost analysis.

CE 762. Advanced Foundation Engineering. 2 Credits.

Advanced topics in performance and design of foundations. Current topics include a two-dimensional finite element analysis of the foundation and its supporting soil. 2 one-hour lectures. Prereq: CE 661.

CE 770. Hazardous Waste Site Remediation. 3 Credits.

Overview of hazardous waste issues, classification, legislation, process fundamentals, fate and transport of contaminants, management, and treatment/remediation methods. 3 one-hour lectures. S.

CE 771. Economics of Transportation Systems. 3 Credits.

The course will provide an understanding of transportation economics and policy issues facing society. Topics include transportation demand, model costs, transportation competition and market power, transportation regulation, transportation investment, and the economics of transportation safety. Cross-listed with AGECE 771.

CE 772. Rural Logistics and Distribution Management. 3 Credits.

Logistical systems and concepts, distribution management, management of railroads and motor carriers, and location of facilities. Includes agribusiness and natural resource case studies. Cross-listed with AGECE 772.

CE 776. Ground Water and Seepage. 3 Credits.

Groundwater as a resource, relation to hydrologic cycle, well hydraulics, seepage, ground water quality and contamination, ground water flow models. 3 one-hour lectures. S.

CE 778. Transportation Administration. 3 Credits.

Public organization behavior and administration, fund accounting, public budgeting, financial management, and strategic management of transportation agencies. Includes transportation case studies.

CE 779. Watershed Water Quality Modeling. 3 Credits.

Watershed characteristics, non-point source pollution and modeling, latest watershed-scale water quality modeling tools and software, hands-on applications.

CE 780. Transportation Planning. 3 Credits.

Types of transportation planning; history of urban and statewide transportation planning; development and trends in travel demand forecasting; trip generation, trip distribution, mode choice, traffic assignment; transportation plans for modal, and multi-modal alternatives; policy formulation and analysis. 1 three-hour lecture. S.

CE 781. Traffic Engineering. 3 Credits.

Traffic characteristics, studies, and control devices; operations analysis and design; aspects of signing, signalization, markings, and lighting; accident analysis; traffic laws and ordinances; work zone safety practices; arterial and freeway management. 1 three-hour lecture plus two-hour laboratory work. S.

CE 782. Introduction to Intelligent Infrastructure. 3 Credits.

Intelligent infrastructure and associated technologies for sensing, detection, and measurements used in civil infrastructure applications (can be applied to structure, transportation, and geotechnical engineering field).

CE 790. Graduate Seminar. 1-3 Credits.

CE 791. Temporary/Trial Topics. 1-5 Credits.

CE 793. Individual Study/Tutorial. 1-5 Credits.

CE 795. Field Experience. 1-15 Credits.

CE 796. Special Topics. 1-5 Credits.

CE 797. Master's Paper. 1-3 Credits.

CE 798. Master's Thesis. 1-10 Credits.

CE 892. Graduate Teaching Experience. 1-6 Credits.

CE 899. Doctoral Dissertation. 1-15 Credits.

Classical Languages (CLAS)

CLAS 194. Individual Study. 1-5 Credits.

CLAS 196. Field Experience. 1-15 Credits.

CLAS 199. Special Topics. 1-5 Credits.

CLAS 291. Seminar. 1-3 Credits.

CLAS 294. Individual Study. 1-5 Credits.

CLAS 299. Special Topics. 1-5 Credits.

CLAS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CLAS 391. Seminar. 1-3 Credits.

CLAS 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CLAS 394. Individual Study. 1-5 Credits.

CLAS 399. Special Topics. 1-5 Credits.

CLAS 491. Seminar. 1-5 Credits.

CLAS 494. Individual Study. 1-5 Credits.

CLAS 496. Field Experience. 1-15 Credits.

CLAS 499. Special Topics. 1-5 Credits.

Coatings and Polymeric Materials (CPM)

CPM 194. Individual Study. 1-5 Credits.

CPM 196. Field Experience. 1-15 Credits.

CPM 199. Special Topics. 1-5 Credits.

CPM 291. Seminar. 1-5 Credits.

CPM 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 294. Individual Study. 1-5 Credits.

CPM 299. Special Topics. 1-5 Credits.

CPM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CPM 391. Seminar. 1-3 Credits.**CPM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 394. Individual Study. 1-5 Credits.**CPM 397. FE/Coop Ed/Internship. 1-4 Credits.****CPM 399. Special Topics. 1-5 Credits.****CPM 436. Biopolymers and Biocomposites. 3 Credits.**

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CHEM 436 and ME 436. {Also offered for graduate credit - See CPM 636.}.

CPM 451. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.

Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for graduate credit - see CPM 651.}.

CPM 472. Environment and Chemical Industries. 2 Credits.

Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. Recommended Prereq: CHEM 121. {Also offered for graduate credit - see CPM 672.}.

CPM 473. Polymer Synthesis. 3 Credits.

Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 673.}.

CPM 474. Applied Polymer Science. 3 Credits.

Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. Prereq: CHEM 240 or CHEM 342. {Also offered for graduate credit - see CPM 674.}.

CPM 475. Coatings' Materials Science. 3 Credits.

Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 474. {Also offered for graduate credit - see CPM 675.}.

CPM 483. Polymer Practicum. 2 Credits.

Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 473. {Also offered for graduate credit - see CPM 683.}.

CPM 484. Coatings I Laboratory. 2 Credits.

Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 474. Recommended Coreq: CPM 474. {Also offered for graduate credit - see CPM 684.}.

CPM 485. Coatings II Laboratory. 2 Credits.

Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 475. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 484. Recommended Coreq: CPM 475. {Also offered for graduate credit - see CPM 685.}.

CPM 486. Corrosion and Materials. 3 Credits.

Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Recommended Prereq: CHEM 121 or CHEM 150. Cross-listed with CHEM 486. {Also offered for graduate credit - see CPM 686.}.

CPM 487. Corrosion and Materials Laboratory. 1 Credit.

The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 486. {Also offered for graduate credit - see CPM 687.}.

CPM 491. Seminar. 1-5 Credits.**CPM 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CPM 493. Undergraduate Research. 1-5 Credits.**CPM 494. Individual Study. 1-5 Credits.****CPM 496. Field Experience. 1-15 Credits.****CPM 499. Special Topics. 1-5 Credits.****CPM 636. Biopolymers and Biocomposites. 3 Credits.**

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CHEM 636 and ME 636. {Also offered for undergraduate credit - See CPM 436.}

CPM 651. Laboratory, Chemical, Radiation, and Biological Safety. 1 Credit.

Hazards and safe practices in chemical, radiation and biological laboratories, applicable to all studies at NDSU. Recognized by the University as completion (for credit) of safety training to work in a research laboratory. {Also offered for undergraduate credit - see CPM 451.}

CPM 672. Environment and Chemical Industries. 2 Credits.

Environmental issues as they pertain to the chemical industry. Topics to include environmental regulations, the issues with disposal and waste, and designing environmentally compliant processes. {Also offered for undergraduate credit - see CPM 472.}

CPM 673. Polymer Synthesis. 3 Credits.

Chemical synthesis of all types of polymers, including the understanding and tailoring of materials formed by these very high molecular weight molecules. Polymers have unique properties due to their conformation and high molecular mass, and are used in a wide variety of applications from paints to structural, engineering materials. {Also offered for undergraduate credit - see CPM 473.}

CPM 674. Applied Polymer Science. 3 Credits.

Polymers are used in many important applications such as coatings, adhesives, and composites among others. Beginning with a survey of the main methods of polymer and resin synthesis, the course will emphasize the use of polymers in coatings and other applications including polymer structure - property relationships, formulation concepts, methods of evaluation, and use of solvents. {Also offered for undergraduate credit - see CPM 474.}

CPM 675. Coatings' Materials Science. 3 Credits.

Materials science of composite materials with a focus on polymeric coatings. Includes properties of component materials, design, testing and application. Specialized topics include corrosion, rheology, appearance science and adhesion. Prereq: CPM 674. {Also offered for undergraduate credit - see CPM 475.}

CPM 683. Polymer Practicum. 2 Credits.

Focus on key synthetic methods for polymer synthesis, reaction kinetics, and the characterization methods. Students will be introduced to basic lab skills and the analytical tools used to synthesize and characterize macromolecules. Prereq: CPM 673. {Also offered for undergraduate credit - see CPM 483.}

CPM 684. Coatings I Laboratory. 2 Credits.

Preparation and testing of coatings, synthesis and characterization of resins, characterization of coatings. Laboratory counterpart to CPM 674. Recommended Coreq: CPM 674. {Also offered for undergraduate credit - see CPM 484.}

CPM 685. Coatings II Laboratory. 2 Credits.

Formulation and application testing of coatings versus property requirements; color measurement and matching. Laboratory counterpart to CPM 675. 1 six-hour laboratory. Hours flexible. Recommended Prereq: CPM 684. Recommended Coreq: CPM 675. {Also offered for undergraduate credit - see CPM 485.}

CPM 686. Corrosion and Materials. 3 Credits.

Corrosion science and engineering: basic electrochemistry of corrosion, measurement of corrosion, choice of materials in engineering design to mitigate corrosion, corrosion control by coatings, evaluation of corrosion protection, and areas of special corrosion problems. Cross-listed with CHEM 686. {Also offered for undergraduate credit - see CPM 486.}

CPM 687. Corrosion and Materials Laboratory. 1 Credit.

The laboratory will allow the students to become acquainted with experimental techniques for the study of corrosion processes and the failure of materials. Additionally, the methods for protection of materials will be practiced. Recommended Co-req: CPM 686. {Also offered for undergraduate credit - see CPM 487.}

CPM 690. Graduate Seminar. 1 Credit.

CPM 695. Field Experience. 1-15 Credits.

CPM 696. Special Topics. 1-5 Credits.

CPM 771. Modern Methods of Polymer Characterization. 3 Credits.

Understanding the physical properties of polymers and methods for their characterization. Focusing on the significance and interplay of physical parameters and the underlying physics of the characterization methods.

CPM 773. Organic Chemistry Of Coatings. 3 Credits.

Synthesis of polymers used in coating systems, polymers having tailored and defined architectures; crosslinking reactions used in coatings. Recommended Prereq: CHEM 741.

CPM 775. Color And Appearance. 3 Credits.

Topics in color and appearance in coatings, Colorimetry, Color and Gloss Measurement, Optical Properties of Pigments, Opacity, CIE and LAB Color Spaces, Color Matching. Recommended Prereq: CPM 675.

CPM 776. Computational Characterization of Materials and Experimental Design. 3 Credits.

The course includes introduction to cheminformatics and computational chemistry methods to analyze, predict properties and design new chemicals, polymeric and nano- and hybrid materials. The study of computational chemistry approaches together with cheminformatics encompasses the design, creation, organization, management, retrieval, analysis, dissemination, visualization and utilization of chemical information. The primary goal of this course is to teach students how to solve chemical problems computationally and analyze properties. Experimental design methods in relation to chemical experiments also will be given as an important part of chemical information use to obtain and treat experimental data effectively. Prereq: CPM 675 or CPM 636 or CHEM 636 or ME 636.

CPM 778. Physical Chemistry of Polymers. 3 Credits.

Examines the interrelationships among polymer structure, morphology, physical state and properties. Key aspects include molecular weight, and its distribution, and the organization of the atoms along the polymer chain. Recommended Prereq: CPM 673.

CPM 782. Physical Chemistry Of Coatings. 3 Credits.

Thermodynamics of interfaces, transport in coatings, colloid stability, advanced CPVC concepts, film formation, particle size effects, and theories of coating application methods. Recommended Coreq: CPM 674.

CPM 786. Polymeric Materials Design. 3 Credits.

Utilization of organic, polymer and supramolecular chemistry principles for synthesis and modification of polymeric materials for applications in materials science, surface coatings, nanotechnology, engineering and biomaterials design. Prereq: CPM 673 or equivalent.

CPM 787. Sustainable Product Design. 3 Credits.

Scientists and engineers can fundamentally change the environmental footprint of modernity. To make an effective change, they require tools to identify "better" materials and product designs. This course examines the use of life cycle thinking as well as environmental and cost assessment tools to identify product and system design options that balance environmental and economic performance. Special focus of the course will be on the production of chemicals and polymeric materials. Recommended Prereq: CHEM 121.

CPM 790. Graduate Seminar. 1 Credit.

CPM 791. Temporary/Trial Topics. 1-5 Credits.

CPM 793. Individual Study/Tutorial. 1-5 Credits.

CPM 795. Field Experience. 1-15 Credits.

CPM 796. Special Topics. 1-5 Credits.

CPM 798. Master's Thesis. 1-10 Credits.

CPM 899. Doctoral Dissertation. 1-15 Credits.

College of Health Professions (CHP)

Courses

CHP 125. Medical Terminology for Health Professionals. 1 Credit.

A systematic study of building medical terms and understanding their relationship to human anatomy and physiology, pathology and medical treatment. Pre-MLS, pre-RC, pre-RS, pre-Nursing, pre-Pharmacy majors will receive first preference. Remaining spots, up to the class limit, will then be open to all major programs.

CHP 184. Understanding and Developing Compassion in Patient Care. 1 Credit.

Examination of multiple perspectives on compassion, and reflection on the role of compassion and empathy broadly and in relation to healthcare. Opportunity to apply these concepts through volunteer service in a patient care setting. Restrictions: Pre-Radiologic Sciences, Pre-Respiratory Care or Pre-Medical Laboratory Science majors only.

CHP 190. Critical Thinking and Academic Success. 2 Credits.

This course provides students with opportunities to develop proficient critical thinking skills as they are used in the health professions. This course will also immerse students in reasoning-related activities that facilitate academic success, teamwork, and a demonstrated commitment to the roles and responsibilities required of all health care providers. This course replaces University 189 and analogous courses. The proposed course will be required for all College of Health Professions (CHP) entry level degree programs. The course is required for all students in the College. It will not be waived for students transferring in more than 24 credits. Prereq: Students must declare a pre-professional major in the College of Health Professions (CHP).

CHP 296. Field Experience. 1-15 Credits.**CHP 300. Introduction to the U.S. Health Care System. 3 Credits.**

This course introduces students to the structure, design, and groups of individuals who participate in the U.S. health care systems. Particular emphasis will be placed on describing and understanding the roles and responsibilities of various health care professions, describing and understanding the major organizations and/or settings in which health care is provided in the U.S., and describing and understanding the major mechanisms by which health care is financed. Students will also gain an understanding of how these components of the U.S. health care system frame major issues of health care policy and public health that include, but are not limited to ensuring access to health services, ensuring high quality health care, and ensuring that health care is provided efficiently. This course will also immerse students in reasoning-related activities that facilitate inter-professional teamwork and a demonstrated commitment to the roles and responsibilities required of all health care professionals. Prereq: Health Services major and junior or senior standing.

CHP 301. Research Methods in Health Services. 3 Credits.

This course introduces students to tools and techniques used in health-related research and evidence-based medicine. Students will also develop skills and confidence necessary to read, synthesize, and evaluate the health services literature. Prereq: STAT 330 with a grade of C or higher, a B.S. in Health Services major and junior standing or higher.

CHP 321. Perspectives for Wellness. 3 Credits.

This course will explore multiple perspectives in developing healthy habits for living well that involve the body and the mind. This course is offered completely online. The duration of the course is 8 weeks. Prereq: Sophomore, Junior or Senior standing or completion of HDFS 242.

CHP 325. Clinical Applications of Genetics. 2 Credits.

Course designed for pharmacy, nursing, allied science, and other pre-professional students focusing on the necessary knowledge and skills to apply genetic information in the health care environment.

CHP 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHP 391. Seminar. 1-5 Credits.**CHP 400. Interprofessional Health Care Practice. 3 Credits.**

This course is designed for pharmacy, nursing, allied sciences, and other allied health students focusing on the necessary knowledge, skills, and attitudes to function as an effective member of the health care team. Prereq: PHRM 455 or NUR 341 and 342 or MLS 200 or RC 200 or RS 200. Cross-listed with HNES.

CHP 450. Complementary and Alternative Therapies: An Evidence-Based Approach. 2 Credits.

This course is designed to provide health professions students with an overview of all forms of complementary and alternative medicine (CAM) commonly practiced in the United States. Students will develop knowledge, skills, and practical tools necessary to understand and evaluate CAM, and provide recommendations for appropriate use to patients or other health care professionals. Prereq: NURS 210 with a grade of C or better or PHRM 480 with a grade of C or better.

CHP 460. Scientific Writing for Health Professionals. 2 Credits.

Students will develop skills and engage with concepts that will help them communicate with scientific, patient, and public audiences. This course is designed to be useful for students in any department in the College of Health Professions but is especially recommended for pharmacy students interested in pursuing a residency. Prereq: PHRM 480 with a grade of C or higher. {Also available for graduate credit - see CHP 660.}.

CHP 479. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CHP 489. Health Services Capstone. 1 Credit.

The purpose of this course is to provide an opportunity for students to reflect upon their experiences in the Bachelor of Science in Health Services program, and use that opportunity for reflection to develop a comprehensive plan that integrates coursework taken throughout the program and posits a clear career trajectory based on that plan. Prereq: Health Services major in their final semester of study.

CHP 491. Seminar. 1-5 Credits.**CHP 660. Scientific Writing for Health Professionals. 2 Credits.**

Students will develop skills and engage with concepts that will help them communicate with scientific, patient, and public audiences. This course is designed to be useful for students in any department in the College of Health Professions but is especially recommended for pharmacy students interested in pursuing a residency. Prereq: PHRM 480 with a grade of C or higher. {Also available for undergraduate credit - see CHP 460.}.

Communication (COMM)

COMM 101. Majors and Careers in Communication. 1 Credit.

This course serves as an introduction to the Department of Communication at NDSU. Students will learn more about their major, their career options, and relevant extracurricular opportunities, along with the skills, techniques, and resources that will help them achieve their professional goals.

COMM 110. Fundamentals of Public Speaking. 3 Credits.

Theory and practice of public speaking with emphasis on content, organization, language, delivery, and critical evaluation of messages.

COMM 111. Honors Public Speaking. 3 Credits.

Accelerated theory and practice of public speaking with emphasis on content, organization, language, delivery, and critical evaluation of messages. Equivalent to COMM 110. Prereq: GPA of 3.5 or higher.

COMM 112. Understanding Media and Social Change. 3 Credits.

Exploration of the purpose, function, and impact of media on society.

COMM 114. Human Communication. 3 Credits.

Overview of communication theory with emphasis on information transmission and social influence functions of communication behavior in personal and mediated contexts.

COMM 133. Introduction to Agricultural Communication. 3 Credits.

This course provides an introduction to agricultural communication as a professional field. The course will also provide an overview of career options and professional skills and competencies required of agricultural communications.

COMM 150. Forensic Practice. 1 Credit.

Applied speaking experiences in competitive and non-competitive settings. Speaking experiences in public address, oral interpretation, reader's theatre settings, and competitive debate offered. May be repeated.

COMM 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

COMM 194. Individual Study. 1-3 Credits.

COMM 196. Field Experience. 1-15 Credits.

COMM 199. Special Topics. 1-5 Credits.

COMM 200. Introduction to Media Writing. 3 Credits.

Introduction to writing in the styles and forms required in journalism and strategic communication. Prereq: COMM 112, ENGL 120.

COMM 212. Interpersonal Communication. 3 Credits.

Theory and practice of communication in interpersonal relationships. Includes aspects of self-expression and relationship communication.

COMM 216. Intercultural Communication. 3 Credits.

Exploration of the definition, models, and verbal processes of communication between different cultural groups.

COMM 220. Persuasion. 3 Credits.

Exploration of the role and function of persuasion in personal, professional, and civic life. Provides an overview of critical, rhetorical, and social scientific theories of persuasion.

COMM 245. Principles of Broadcast Production. 3 Credits.

Creation, critique, and analysis of audio production and single camera video productions with special emphasis on radio and television news. Restricted to Communication professional majors and minors.

COMM 260. Introduction to Web Design. 3 Credits.

This course aims to orient students to Web concepts, design, presentation, and evaluation. Prereq: CSCI 114, CSCI 116, MIS 116 or CSCI 160.

COMM 261. Introduction to Web Development. 3 Credits.

Introduces the tools used by Web Development professionals, including HTML, Web editors, imaging software, Javascript, and Acrobat pdf format. Prereq: COMM 260.

COMM 291. Seminar. 1-3 Credits.

COMM 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 294. Individual Study. 1-5 Credits.**COMM 296. Field Experience. 1-15 Credits.****COMM 299. Special Topics. 1-5 Credits.****COMM 301. Rhetorical Traditions. 3 Credits.**

Historical/descriptive examination of rhetorical theory from the classical through modern periods. Restricted to Communication professional majors and minors.

COMM 308. Business and Professional Speaking. 3 Credits.

Oral and written communication skills for professional and business settings. Includes resume, cover letter and memo writing; interpersonal and group applications; and interviewing and professional presentations emphasis. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 310. Advanced Media Writing. 3 Credits.

Construction of professional quality messages for the modern media landscape. Prereq: B or better in COMM 200. Restricted to Communication professional majors and minors.

COMM 313. Editorial Processes. 3 Credits.

Principles of copy-editing, headline composition, and layout for media publications. Prereq: COMM 200 and restricted to Communication professional majors and minors.

COMM 315. Small Group Communication. 3 Credits.

Focus on group processes, methods of problem solving, parliamentary procedures, and relational components of group interaction. Restricted to Communication professional majors and minors.

COMM 316. Conflict Communication. 3 Credits.

Exploration of conflict interaction in business and public sectors; application of negotiation strategies, decision-making, problem-solving, and bargaining. Prereq: Restricted to Communication professional majors and minors.

COMM 318. Argumentation and Advocacy. 3 Credits.

Theory and process of argumentation with practical experience in preparation and delivery of formal and informal arguments. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 320. Communication Research Methods. 3 Credits.

Overview and application of basic methods used in communication research. Prereq: Restricted to Communication professional majors and minors.

COMM 330. Photography for the Media. 3 Credits.

An introduction to digital photography techniques for students who plan to specialize in preparing visual images for print and online media. Prereq: students must be Communication majors or minors in the professional program.

COMM 340. Social Research Methods. 3 Credits.

Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with SOC 340.

COMM 341. Social Research Methods Laboratory. 1 Credit.

Laboratory to accompany COMM 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with SOC 341.

COMM 346. Sports Broadcasting. 3 Credits.

Overview of television sports broadcasting skills with an emphasis on reporting, shooting highlights, anchoring, editing and play-by-play announcing.

COMM 347. Television On-Air Performance. 3 Credits.

Introduction to basic skills required of an on-air television personality, including news and sports anchors, talk show hosts, and on-site production hosts. Prereq: COMM 345.

COMM 362. Principles of Design For Media. 3 Credits.

Introduction to design techniques for the development and publication of a variety of media. Prereq: Restricted to Communication professional majors and minors.

COMM 363. Advanced Web Design. 3 Credits.

Students build advanced competence in developing and maintaining websites using advanced web design programming. Prereq: COMM 260, COMM 261.

COMM 375. Principles of Strategic Communication. 3 Credits.

Advertising and public relations are studied theoretically and as professional fields; theory, principles, and practices are used in creating strategic communication campaigns. Prereq or Co-req: COMM 200 and restricted to Communication professional majors and minors only.

COMM 376. Advertising Creative Strategies. 3 Credits.

Introduces students to creative ideas in advertising and their translation into words and images. Emphasis is on strategic approaches to creative decision-making across all media. Prereq: COMM 375 Restricted to Communication professional majors and minors.

COMM 377. Media Planning. 3 Credits.

This course introduces students to the basic concepts of media planning and buying. Emphasis is placed on strategic approaches to the media placement process across all forms of media. Prereq: COMM 375 and restricted to Communication professional majors and minors.

COMM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

COMM 380. Health Communication I. 3 Credits.

This course is designed to introduce students to the field of health communication. Students will learn about models of health communication, doctor-patient communication, designing and implementing health campaigns, and organizational communication in health organizations.

COMM 383. Organizational Communication I. 3 Credits.

Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure and interpersonal aspects of supervisor-subordinate relations. Prereq: Junior standing. Cross-listed with BUSN 383. Restricted to Communication professional majors and minors.

COMM 391. Seminar. 1-5 Credits.**COMM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 394. Individual Study. 1-5 Credits.**COMM 396. Field Experience. 1-15 Credits.****COMM 397. Fe/Coop Ed/Internship. 1-4 Credits.****COMM 399. Special Topics. 1-5 Credits.**

Restricted to Communication professional majors and minors.

COMM 412. Gender and Communication. 3 Credits.

Exploration of philosophical and theoretical issues surrounding gender construction, communication, and culture. Focus on ways in which communication in families, schools, media, and other institutions create and sustain gender roles. Restricted to Communication professional majors and minors.

COMM 421. History of Journalism. 3 Credits.

The history and development of journalism as shaped by the political and social environment.

COMM 425. Specialty Writing. 3 Credits.

Methods and practices of effective written communication in a variety of genres used by advertising and public relations professionals. Prereq: COMM 200 and restricted to Communication professional majors and minors.

COMM 431. Communication Ethics and Law. 3 Credits.

Analysis of ethical and legal issues affecting communications and communication industries. Restricted to Communication professional majors and minors.

COMM 435. Critical Approaches to Popular Culture. 3 Credits.

Analysis of popular cultures as a reflection and influencer of social values. Explores how media representation, industry, economics, globalization, and the overlap between politics and entertainment affect American popular culture. Restricted to Communication professional majors and minors.

COMM 442. Digital Media and Society. 3 Credits.

Explores the impact of technological developments on media and mediated culture.

COMM 445. Advanced Broadcast Production. 3 Credits.

Development of skills in the creation, critique, and analysis of television productions in the studio and in the field. Prereq: COMM 345. Restricted to Communication professional majors and minors.

COMM 446. Television Studio Production. 3 Credits.

This course introduces students to studio and control practices as well as producing and anchoring newscasts and talk shows. Students will learn basic production skills including all areas of studio production by working in Bison Information Network's TV studio. Prereq: COMM 345.

COMM 450. Issues in Communication. 3 Credits.

Studies of key issues in the field of communication. May be repeated. Restricted to Communication professional majors and minors.

COMM 465. Convergence Media. 3 Credits.

Techniques for digital storytelling, multimedia content creation, and cross-platform production. Prereq: restricted to Communication professional majors or minors only.

COMM 470. Research for Strategic Communication. 3 Credits.

Students in advertising and public relations must respond to changing contexts as they design and conduct campaigns. This course provides tailored strategies needed by our students as they move into the professional advertising and public relations environments. Prereq: COMM 375.

COMM 472. Public Relations Campaigns. 3 Credits.

Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. Prereq: COMM 375. Prereq or Co-req: COMM 470. Restricted to Communication professional majors and minors.

COMM 473. Case Study in Public Relations. 3 Credits.

Advanced study of applied public relations theory through intense case study analysis and research focused on organizations. Case studies from the Public Relations Society of America are used. Prereq: COMM 375, COMM 470. Restrictions: Restricted to Communication professional majors and minors.

COMM 476. Advertising Campaign Practicum. 3 Credits.

This course challenges students to apply the knowledge they have gained in previous advertising classes. Specifically, students will design an advertising campaign including market research, creative execution, media planning, and account management. Prereq: COMM 376 or 377, COMM 470. Restrictions: Restricted to Communication professional majors and minors.

COMM 483. Organizational Communication II. 3 Credits.

Examination of the structure and function of interpersonal communication networks in formal organizations, methods of network analysis. Prereq: COMM 383. Restricted to Communication professional majors and minors.

COMM 484. Organizational Advocacy and Issue Management. 3 Credits.

Exploration of communication theories and campaigns to assess the impact of historical and contemporary advocacy in both for-profit and non-profit sectors. Prereq: COMM 383.

COMM 485. Risk and Crisis Communication. 3 Credits.

Crisis communication practices in organizations of all types with emphasis on planning, emergency communication, image restoration, and organizational learning. Restricted to Communication professional majors and minors. Prereq: COMM 110. Cross-listed with SAFE 485.

COMM 487. Organizational Power and Leadership. 3 Credits.

This course emphasizes communicative dimensions of organizational leadership. Theory will be discussed as a foundation for leadership practices. Prereq: COMM 383. Restricted to Communication professional majors and minors.

COMM 491. Seminar. 1-5 Credits.

Restricted to Communication professional majors and minors.

COMM 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

COMM 493. Undergraduate Research. 1-5 Credits.**COMM 494. Individual Study. 1-5 Credits.**

Restricted to Communication professional majors and minors.

COMM 496. Field Experience. 1-15 Credits.

Restricted to Communication professional majors and minors.

COMM 499. Special Topics. 1-5 Credits.

Restricted to Communication professional majors and minors.

COMM 690. Graduate Seminar. 1-3 Credits.**COMM 695. Field Experience. 1-15 Credits.****COMM 696. Special Topics. 1-5 Credits.****COMM 700. Research Methods in Communication. 3 Credits.**

Introduction to research planning and design, methods of research, and presentation of research results.

COMM 701. Advanced Research Methods in Communication I. 3 Credits.

Advanced research methods in communication; research planning, design, and presentation. Prereq: COMM PhD students only.

COMM 702. Introduction to College Teaching in the Humanities and Social Sciences. 3 Credits.

Techniques for effective teaching and assessing learning at the college level. Includes special issues and responsibilities related to college-level teaching.

COMM 704. Qualitative Research Methods in Communication. 3 Credits.

Introduction to theory and practice of qualitative research in communication. Prereq: COMM 700 or COMM 701.

COMM 707. Quantitative Research Methods in Communication. 3 Credits.

Introduction to quantitative research planning and design, methods of research, and presentation of research results. Prereq: COMM 700.

COMM 711. Communication Theory. 3 Credits.

Major theoretical approaches to the study of communication from social scientific and humanistic traditions.

COMM 712. Emerging Trends in Teaching and Learning Online. 3 Credits.

Study of the theory, historical development, and practical applications of the distance / online education movement. Examination of learning theory and instructional design theory, as it relates to online course development.

COMM 715. Theories of Small Group Communication. 3 Credits.

Survey of theoretical constructs of communication in the small group setting. Examination of current methods of research.

COMM 731. Communication Ethics Seminar. 3 Credits.

Study of ethical theories and their relationship to the mass media.

COMM 735. Theories of Media, Technology, and Society. 3 Credits.

This course examines social scientific and critical theories of media, communication technology, and social change.

COMM 750. Advanced Issues in Communication. 3 Credits.

Advanced theory and philosophy of research issues in the field of communication. May be repeated.

COMM 767. Rhetorical Criticism. 3 Credits.

Survey of critical methods of inquiry that may be applied to oral discourse and frameworks for critically evaluating communication processes and products.

COMM 783. Advanced Organizational Communication I. 3 Credits.

Exploration of the theory of management communication practices in organizations. Emphasis on the formal structure of and interpersonal aspects of supervisor-subordinate relations. Prereq: Graduate standing.

COMM 786. Risk Communication. 3 Credits.

Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with SAFE 786.

COMM 790. Graduate Seminar. 1-3 Credits.

COMM 791. Temporary/Trial Topics. 1-5 Credits.

COMM 792. Graduate Teaching Experience. 1-6 Credits.

COMM 793. Individual Study/Tutorial. 1-5 Credits.

COMM 794. Practicum. 1-15 Credits.

COMM 795. Field Experience. 1-15 Credits.

COMM 796. Special Topics. 1-5 Credits.

COMM 797. Master's Paper. 1-3 Credits.

COMM 798. Master's Thesis. 1-10 Credits.

COMM 799. Master's Examination. 1-6 Credits.

Literature review, research and preparation for the master's examination option.

COMM 892. Graduate Teaching Experience. 1-6 Credits.

COMM 893. Individual Study/Tutorial. 1-5 Credits.

COMM 899. Doctoral Dissertation. 1-15 Credits.

Community Development (CED)

CED 709. Foundations in Community Development. 3 Credits.

Introduces students in the on-line Master's degree program in community development to the on-line classroom environment, and to the science, practice, and profession of community development.

CED 711. Principles and Strategies of Community Change. 3 Credits.

Analyze theories, principles, strategies and practices of community change and development from a multidisciplinary perspective in order to construct a personal framework for the practice of community economic development. Prereq: CED 709.

CED 713. Community Development II: Organizing for Community Change. 3 Credits.

An examination of the role of civil society in community planning efforts, the connection between social relationships and economic activity, the structure and implications of power, conflict management, inclusiveness, and equitable change. Prereq: CED 709.

CED 715. Community Analysis: Introduction to Methods. 3 Credits.

An introduction to the research methods relevant to community development, strategies for reporting and applying findings in community action, and issues of research ethics and inclusiveness. Prereq: CED 709.

CED 717. Community and Regional Economic Policy and Analysis. 3 Credits.

Explores theories of economic growth, community economic and industrial base, sources of economic growth or decline, and strategies for local and regional economic development. Prereq: CED 709.

CED 719. Community Natural Resource Management. 3 Credits.

Theoretical frameworks, methodological investigation, and applied practices of natural resource development as a component of community economic development. Prereq: CED 709.

CED 721. Introduction to Native Community Development. 3 Credits.

Examines community development in the context of diverse tribal structures and cultures, and provides a holistic analysis of the unique histories and jurisdictional considerations of Native communities. Prereq: CED 709.

CED 723. Building Native Community/Economic Capacity. 3 Credits.

Non-Western approaches to helping Native communities build their economic capacity through participatory, culture-centered, and strength-based approaches to development. Prereq: CED 709.

CED 731. Ecological Economics. 3 Credits.

Examines the synthesis of ecology and economic utility through the inherent interdependence, jointness, and potential complementarity between the ecology and economy of a place. Prereq: CED 709.

CED 733. Sustainable Communities. 3 Credits.

Links the management of natural capital in communities and society to their implications for community sustainability in terms of economic vitality, social well-being, and ecosystem health. Prereq: CED 709.

CED 741. Economic Development Strategies and Programs. 3 Credits.

This course covers the most widely used strategies and programs for economic development within an action planning process, including retention and expansion of business and industry, retail development, downtown revitalization, incubating new firm creation, industrial attraction, and tourism development. Prereq: CED 709.

CED 745. Land Management Planning. 3 Credits.

Examines the principles and practices of real estate, including legal, economic, and social implications from the viewpoint of real estate practitioners, investors, and society. The course covers land use programs and methods of zoning. Prereq: CED 709.

CED 752. Basic Grant Development and Management. 3 Credits.

Introduces the grant development and management process, explores steps in the search for funding sources, examines program budgets and justifications, and lists plans for program sustainability. Prereq: CED 709.

CED 753. Not-for-profit Management. 3 Credits.

This course examines the unique management issues faced by not-for-profit community economic development organizations in terms of policy setting, participation, administration, and accountability. Prereq: CED 709.

CED 755. Community Leadership and Capacity Building. 3 Credits.

This course defines and applies leadership strategies to the community economic development context. The course examines the link between leadership and community capacity. Prereq: CED 709.

CED 756. Community Engagement. 3 Credits.

Provides foundational knowledge of community engagement, including community change readiness assessment, goal determination, and strategies to achieve change. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 758. Evaluation of Organizations and Programs. 3 Credits.

Introduction to philosophy, techniques, and methodologies of organizational and program evaluation. Topics include overview of program evaluation and theory, techniques to evaluate program progress and performance, evaluation designs, assessing program efficiency, models to diagnose organizations, and methods to assess program performance. Prereq: Students must be admitted to the GP-IDEA Community Development Master's degree program or have permission from the instructor.

CED 761. Government, Politics, & Community Development. 3 Credits.

Introduction to classical and contemporary concepts of federalism, public administration, public policy, and politics with an emphasis on their bearing on community development activities and outcomes.

CED 763. Immigrants and Communities. 3 Credits.

Using current scholarship and primary data gathered by the students, this course examines community-immigrant interaction and how it influences community development and the human capital of immigrant inclusion. Prereq: The course is open first to students in the GP-IDEA Community Development program and secondly to other graduate students with the permission of the instructor.

CED 790. Graduate Seminar. 1-5 Credits.**CED 793. Individual Study/Tutorial. 1-5 Credits.****CED 798. Master's Thesis. 1-10 Credits.**

Computer Science (CSCI)

CSCI 114. Computer Applications. 3 Credits.

General introduction to computer concepts, operating systems, the internet, word processing, spreadsheets, database management, and presentation software. Credit awarded only for CSCI 114 or CSCI/MIS/TL 116, not both.

CSCI 122. Visual BASIC. 3 Credits.

Introduction to programming in the BASIC/Visual BASIC language.

CSCI 159. Computer Science Problem Solving. 3 Credits.

Computer-based problem solving techniques are introduced in the context of the Internet, including web-site development. Programming concepts, data structures and algorithms, as well as modeling techniques are discussed.

CSCI 160. Computer Science I. 4 Credits.

Introduction to computer science including problem solving, algorithm development, and structured programming in a high-level language. Emphasis on design, coding, testing, and documentation of programs using accepted standards of style. Prereq: MATH 103.

CSCI 161. Computer Science II. 4 Credits.

Continuation of CSCI 160 that emphasizes more advanced programming language features and basic data structures. Students will learn to incorporate advanced programming features such as Interfaces and Generics into the programs they develop. Prereq: CSCI 160.

CSCI 172. Intermediate Visual BASIC. 3 Credits.

Elements of Visual Basic for those with previous programming background. Topics include fundamental constructs, Active X controls, file processing, database management, and SQL. Prereq: one semester/experience in any programming language.

CSCI 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

CSCI 194. Individual Study. 1-3 Credits.

CSCI 196. Field Experience. 1-15 Credits.

CSCI 199. Special Topics. 1-5 Credits.

CSCI 212. Self-Paced C++. 1 Credit.

Introduction to the C++ programming language. Students complete exercises and programming assignments at their own pace. Prereq: Programming skill in another language.

CSCI 213. Modern Software Development. 3 Credits.

This course provides students with exposure to, and practice with a modern software development environment. Students do individual projects covering all the major phases of prescriptive software development including: requirements engineering, design, construction, testing and debugging. Prereq: CSCI 161.

CSCI 214. Self-Paced C. 1 Credit.

Introduction to the C programming language. Students complete exercises and programming assignments at their own pace. Prereq: CSCI 160.

CSCI 222. Discrete Mathematics. 3 Credits.

Sets, functions, relations, logic, methods of proof, mathematical induction, combinatorics, recurrence relations, generating functions. Prereq: CSCI 160.

CSCI 227. Computing Fundamentals I. 3 Credits.

Two-semester sequence focused on problem solving and writing computer programs in a modern high-level programming language in a state-of-the-art programming environment. Second semester includes an introduction to the object-oriented programming paradigm. Prereq: MATH 103 or MATH 107.

CSCI 228. Computing Fundamentals II. 3 Credits.

Two-semester sequence focused on problem solving and writing computer programs in a modern high-level programming language in a state-of-the-art programming environment. Second semester includes an introduction to the object-oriented programming paradigm. Prereq: CSCI 227.

CSCI 277. Introduction to UNIX. 3 Credits.

This course introduces students to the UNIX operating system environment. Topics include basic UNIX commands, operating system installation and administration, application installation, use of alternative shells, web servers, and system security. Cross-listed with MIS 277.

CSCI 291. Seminar. 1-3 Credits.

CSCI 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 294. Individual Study. 1-5 Credits.**CSCI 299. Special Topics. 1-5 Credits.****CSCI 312. Survey of Programming Languages. 3 Credits.**

This course provides an introduction to major types of programming languages including block-structured, object-oriented, dynamic, declarative and functional languages. For each of the languages, an example language other than the main teaching language will be selected. Prereq: CSCI 228.

CSCI 313. Advanced Software Development. 3 Credits.

This course provides students with an understanding of the full-stack development of real-world software application using software frameworks. Students will work in small teams to use an agile methodology to develop a full-stack application. Prereq: CSCI 213.

CSCI 336. Theoretical Computer Science. 3 Credits.

Parsing techniques, context-free languages, Turing machines, recursive and recursively enumerable languages, unrestricted grammars, unsolvable decision problems, computability, introduction to computational complexity. Prereq: CSCI 222.

CSCI 345. Topics on Personal Computers. 3 Credits.

Exploration of some aspects of personal computers not covered in other courses, varies each time it is offered. May be repeated. Prereq: CSCI 161.

CSCI 366. Database Systems. 3 Credits.

Introduction to database systems, including database design, data modeling, storage structures, database theory, and the building of database applications. Prereq: CSCI 161.

CSCI 371. Web Scripting Languages. 3 Credits.

This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with MIS 371.

CSCI 372. Comparative Programming Languages. 3 Credits.

Fundamental concepts of programming languages and inherent design choices are analyzed. The course focuses mainly on concepts of block-structured and object-oriented languages, but other languages, such as declarative and functional languages, also are discussed. Prereq: CSCI 161.

CSCI 374. Computer Organization and Architecture. 3 Credits.

Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. 3 lectures, 1 two-hour VHDL-based laboratory. Prereq: ECE 173, ECE 275 with a grade of C or better. Cross-listed with ECE.

CSCI 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CSCI 391. Seminar. 1-3 Credits.**CSCI 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 394. Individual Study. 1-5 Credits.**CSCI 396. Field Experience. 1-15 Credits.****CSCI 397. Fe/Coop Ed/Internship. 1-4 Credits.****CSCI 399. Special Topics. 1-5 Credits.****CSCI 403. Defensive Network Security. 3 Credits.**

This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 603}.

CSCI 404. Ethical Hacking. 3 Credits.

This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for graduate credit - See CSCI 604}.

CSCI 409. Cybersecurity Law and Policy. 3 Credits.

This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 609}.

CSCI 410. Computer Crime and Forensics. 3 Credits.

This course covers the basic types of computer crimes. It introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. Prereq: CSCI 161. {Also offered for graduate credit - see CSCI 610}.

CSCI 413. Principles of Software Engineering. 3 Credits.

An introduction to concepts of software engineering. Software development activities through a project. Lifecycle models, requirements, specification, design, implementation, and testing. Software quality, tools, and techniques. Prereq: CSCI 313 or ECE 275. {Also offered for graduate credit - see CSCI 613.}.

CSCI 416. Software Architecture and Design. 3 Credits.

This course covers both architectural design and module design. Students receive practice in using a set of design patterns to produce software designs with several different types of architecture. Substantial presentation and practice with the UML modeling language are provided. Prereq: CSCI 313.

CSCI 418. Simulation Models. 3 Credits.

Fundamental techniques involved in using a computer to simulate business, social, and industrial systems. Includes principles of random variate generation, statistical sampling, and design of experiments. Prereq: STAT 367. {Also offered for graduate credit - see CSCI 618.}.

CSCI 419. Software Testing and Debugging. 3 Credits.

This course covers the goals, principles, practices, evaluations, and limitations of software testing and software debugging. Prereq: CSCI 313.

CSCI 420. Introduction to Data Science in Python. 3 Credits.

This course introduces the foundations of data science. It covers python tools for data acquisition, wrangling, analysis, and visualization. Prereq: CSCI 372. {Also available for graduate credit - see CSCI 620.}.

CSCI 426. Introduction to Artificial Intelligence. 3 Credits.

Introduction to artificial intelligence for undergraduates. Includes basic AI concepts and techniques. Prereq: CSCI 222 and CSCI 372. {Also offered for graduate credit - see CSCI 626.}.

CSCI 428. Computational Techniques for Environmental Sustainability. 3 Credits.

This course covers computational technology that is relevant for work in sustainability. Geo-spatial data management, statistical concepts for data mining, and computational modeling techniques, are discussed in the context of environmental sustainability. Prereq: CSCI 161. {Also offered for graduate credit - see CSCI 628.}.

CSCI 429. Network Applications and Environments. 3 Credits.

This course is devoted to the study of network services and the development of internet resources. Prereq: CSCI 161 or CSCI 228.

CSCI 436. Intelligent Agents. 3 Credits.

Fundamentals of Intelligent Agents technology, agent communication languages, applications, and intelligent agents development. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 636.}.

CSCI 445. Software Projects Capstone. 3 Credits.

Presentations on the mechanics of working cooperatively as a team doing commercial software development. Students work in teams to deliver realistic work products to local businesses. Course presentations cover teamwork, software development pragmatics, and software documentation. Prereq: CSCI 313 and CSCI 366.

CSCI 450. Cloud Computing. 3 Credits.

The course discusses various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer cluster, virtual machines, design of cloud computing platforms, cloud programming and software environments. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 650.}.

CSCI 453. Linear Programming and Network Flows. 3 Credits.

Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. Prereq: MATH 265. {Also offered for graduate credit - see CSCI 653.}.

CSCI 455. Networking and Parallel Computation. 3 Credits.

This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. Prereq: CSCI 313, CSCI 366. {Also offered for graduate credit - See CSCI 655.}.

CSCI 459. Foundations of Computer Networks. 3 Credits.

This is an introduction to fundamental concepts for the design and analysis of broadband networks. Topics include resource allocation, routing, congestion control, medium access, scheduling, and multicast. Concepts are applied to state-of-the-art systems and protocols such as current and future Internet protocols. Prereq: CSCI 374 or ECE 374. {Also offered for graduate credit - see CSCI 659.}.

CSCI 462. Mobile and Wireless Networks. 3 Credits.

This course provides students with an understanding of networking and multi-programming with a focus on mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Students will write some multi-programs. Prereq: CSCI 313 and CSCI 366. {Also offered for graduate credit - see CSCI 662.}.

CSCI 467. Algorithm Analysis. 3 Credits.

Design, correctness, and analysis of algorithms and data structures. Prereq: MATH 166, CSCI 161 and CSCI 222 or MATH 270. {Also offered for graduate credit - see CSCI 667.}.

CSCI 469. Network Security. 3 Credits.

Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 222, CSCI 459, C/C++ or JAVA. {Also offered for graduate credit - see CSCI 669.}.

CSCI 473. Foundations of the Digital Enterprise. 3 Credits.

This course is designed to familiarize individuals with current and emerging electronic commerce technologies using the Internet. Prereq: junior standing.

CSCI 474. Operating Systems Concepts. 3 Credits.

How operating systems manage the resources of a computer. Topics include processes, concurrency, scheduling, deadlocks, memory allocation, virtual and secondary storage. Prereq: CSCI 374.

CSCI 477. Object-Oriented Systems. 3 Credits.

Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 677.}.

CSCI 479. Introduction to Data Mining. 3 Credits.

Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 366 or CSCI 468). {Also offered for graduate credit - see CSCI 679.}.

CSCI 485. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.

This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. Prereq: CSCI 213 or ECE 275 or ME 213. {Also offered for graduate credit - See CSCI 685.}.

CSCI 488. Human-Computer Interaction. 3 Credits.

Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. Prereq: CSCI 313. {Also offered for graduate credit - see CSCI 688.}.

CSCI 489. Social Implications of Computers. 3 Credits.

Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. Prereq: CSCI 372. {Also offered for graduate credit - see CSCI 689.}.

CSCI 491. Seminar. 1-5 Credits.**CSCI 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CSCI 493. Undergraduate Research. 1-6 Credits.**CSCI 494. Individual Study. 1-5 Credits.****CSCI 496. Field Experience. 1-15 Credits.****CSCI 499. Special Topics. 1-5 Credits.****CSCI 603. Defensive Network Security. 3 Credits.**

This course will cover the design, development and testing of network and software systems for defending computer systems and networks. Key areas of focus will be the development of secure software, software and software system decision making to ensure security and the use of software systems to protect and detect intrusions into computer networks. {Also offered for undergraduate credit - See CSCI 403.}

CSCI 604. Ethical Hacking. 3 Credits.

This course teaches students how to test systems by viewing systems security from the bad actors' perspective in conducting system testing. The course prepares students to take the EC Council Certified Ethical Hacker examination. {Also offered for undergraduate credit - See CSCI 404.}

CSCI 609. Cybersecurity Law and Policy. 3 Credits.

This course will cover the laws and policy related to cybersecurity. This will include law and policy at the international, national and state levels. The impact of national and state law on corporate and institutional policies will be discussed and institutional policy development and implementation will be reviewed. {Also offered for undergraduate credit - See CSCI 409.}

CSCI 610. Computer Crime and Forensics. 3 Credits.

This course covers the basic types of computer crimes. It introduces principles, techniques, tools, and practical skills necessary to perform rudimentary investigations of incidents in which computers play a significant or interesting role. {Also offered for undergraduate credit - see CSCI 410.}

CSCI 613. Principles of Software Engineering. 3 Credits.

An introduction to concepts of software engineering. Software development activities through a project. Lifecycle models, requirements, specification, design, implementation, and testing. Software quality, tools, and techniques. A term paper for graduate students. {Also offered for undergraduate credit - see CSCI 413.}.

CSCI 615. Networking and Parallel Computation. 3 Credits.

This course provides students with an understanding of networking and multi-programming. Students will write some multi-programs. {Also offered for undergraduate credit - See CSCI 415.}.

CSCI 618. Simulation Models. 3 Credits.

Fundamental techniques involved in using a computer to simulate business, social, and industrial systems. Includes principles of random variate generation, statistical sampling, and design of experiments. {Also offered for undergraduate credit - see CSCI 418.}.

CSCI 620. Introduction to Data Science in Python. 3 Credits.

This course introduces the foundations of data science. It covers python tools for data acquisition, wrangling, analysis, and visualization. {Also available for undergraduate credit - see CSCI 420.}.

CSCI 628. Computational Techniques for Environmental Sustainability. 3 Credits.

This course covers computational technology that is relevant for work in sustainability. Geo-spatial data management, statistical concepts for data mining, and computational modeling techniques, are discussed in the context of environmental sustainability. {Also offered for undergraduate credit - see CSCI 428.}.

CSCI 636. Intelligent Agents. 3 Credits.

Fundamentals of Intelligent Agents technology, agent communication languages, applications, and intelligent agents development. {Also offered for undergraduate credit - see CSCI 436.}.

CSCI 641. Introduction to Computer Science Education. 3 Credits.

Overview of the main areas of Computer Science Education. The Active-Learning-Based Teaching Model; Research in Computer Science Education; Teaching Methods in Computer Science Education; and Lab-Based Teaching. Projects include curriculum design for a 2-semester high school sequence and an AP practice test.

CSCI 642. Problem Solving in Computer Science Education. 3 Credits.

Computer-based problem solving techniques are introduced in the context of the Internet, including web-site development. Programming concepts, problem definition and algorithm development, as well as modeling techniques are discussed. Includes structured problem solving with reference to Polya's methodology for mathematical problem solving.

CSCI 650. Cloud Computing. 3 Credits.

The course discusses various topics and technologies related to Cloud Computing. Topics include distributed system models and enabling technologies, computer cluster, virtual machines, design of cloud computing platforms, cloud programming and software environments. {Also offered for undergraduate credit - see CSCI 450.}.

CSCI 653. Linear Programming and Network Flows. 3 Credits.

Linear programming models and applications, primal and dual formulations, computational procedures; introduction to networks, maximum flow, and shortest path problems. {Also offered for undergraduate credit - see CSCI 453.}.

CSCI 654. Operations Research. 3 Credits.

Deterministic and probabilistic models of operations research: networks and project management, dynamic programming, non-linear programming, inventory, queuing, reliability, stochastic processes, and simulation. Prereq: CSCI 653. {Also offered for undergraduate credit - see CSCI 454.}.

CSCI 659. Foundations of Computer Networks. 3 Credits.

This is an introduction to fundamental concepts for the design and analysis of broadband networks. Topics include resource allocation, routing, congestion control, medium access, scheduling, and multicast. Concepts are applied to state-of-the-art systems and protocols such as current and future Internet protocols. {Also offered for undergraduate credit - see CSCI 459.}.

CSCI 662. Mobile and Wireless Networks. 3 Credits.

This course provides students with an understanding of networking and multi-programming with a focus on mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Students will write some multi-programs. {Also offered for undergraduate credit - see CSCI 462.}.

CSCI 667. Algorithm Analysis. 3 Credits.

Design, correctness, and analysis of algorithms and data structures. {Also offered for undergraduate credit - see CSCI 467.}.

CSCI 669. Network Security. 3 Credits.

Cryptography and its application to network and operating system security; authentication; email, web, IP, and wireless security; firewalls and intrusion detection techniques; security threats and countermeasures; legal and ethical issues. Prereq: CSCI 659, C/C++ or JAVA. {Also offered for undergraduate credit - see CSCI 469.}.

CSCI 675. Operating Systems Design. 3 Credits.

Advanced operating systems topics such as protection, errors, and distributed systems. Case studies of representative operating systems. Students work in small teams to implement their own basic operating systems. {Also offered for undergraduate credit - see CSCI 475.}.

CSCI 677. Object-Oriented Systems. 3 Credits.

Introduction to the concepts and advantages of object-oriented computer systems. Introduces exercises with at least one such language. {Also offered for undergraduate credit - see CSCI 477.}.

CSCI 679. Introduction to Data Mining. 3 Credits.

Introduction to data mining includes basic data mining techniques, querying, spreadsheet data mining, data warehouses, evaluation techniques, knowledge discovery in databases, examples and a survey of advanced techniques. Prereq: Basic database course (e.g. CSCI 668 or CSCI 765). {Also offered for undergraduate credit - see CSCI 479.}.

CSCI 685. Autonomous Command and Artificial Intelligence for Robots and Other Cyber-Physical Systems. 3 Credits.

This course will cover the command and control of multi-robot systems. This will include the process of onboard decision making, considering both planning-based and real time decisions. Artificial intelligence techniques for robotic systems will be covered as will the application of similar techniques to non-robot cyber-physical systems. {Also available for undergraduate credit - See CSCI 485.}.

CSCI 688. Human-Computer Interaction. 3 Credits.

Survey of the methodologies and alternatives used in developing and evaluating human-computer interfaces. {Also offered for undergraduate credit - see CSCI 488.}.

CSCI 689. Social Implications of Computers. 3 Credits.

Capstone course for Computer Science. Presentation and discussion of several ethical and social issues that have arisen from the introduction of the computer including copy-protected software and liability for computer software errors. {Also offered for undergraduate credit - see CSCI 489.}.

CSCI 690. Graduate Seminar. 1-3 Credits.**CSCI 695. Field Experience. 1-15 Credits.****CSCI 696. Special Topics. 1-5 Credits.****CSCI 713. Software Development Processes. 3 Credits.**

This course is designed as a breadth course on the software engineering process. Basic concepts are reviewed and reassured to create a basis for higher concepts and techniques.

CSCI 714. Software Project Planning and Estimation. 3 Credits.

This course is designed to introduce the student to concepts and techniques of how to plan for a software project. This includes time and effort estimation, planning and teaming the project, and managing the development activities. Prereq: CSCI 713.

CSCI 715. Software Requirements Definition and Analysis. 3 Credits.

This course is designed to make the student able to identify and capture requirements for a software system and be able to document and assess the requirements. Prereq: CSCI 713.

CSCI 716. Software Design. 3 Credits.

This course covers both architectural design and module design. Students receive practice using a set of patterns to produce software designs with several different types of architecture. Substantial presentation and practice with the UML modeling language is provided. Prereq: CSCI 713.

CSCI 717. Software Construction. 3 Credits.

This course covers the fundamentals of software construction including programming and evaluation of the source code. Students receive a good grounding in and extensive practice with the comprehensive libraries associated with a modern programming language. Prereq: CSCI 713.

CSCI 718. Software Testing and Debugging. 3 Credits.

This course covers the goals, practices, evaluation and limitations of software testing and software debugging. Students receive practice in developing and using test plans and various testing and debugging techniques. Prereq: CSCI 713.

CSCI 724. Survey of Artificial Intelligence. 3 Credits.

Survey of major areas of AI including theorem proving, heuristic search, problem solving, computer analysis of scenes, robotics, natural language understanding, and knowledge-based systems.

CSCI 728. Computer Graphics. 3 Credits.

Principles and algorithms used in computer graphics packages. Emphasis on raster graphics, clipping, hidden-surface elimination, ray-tracing, radiosity.

CSCI 732. Introduction To Bioinformatics. 3 Credits.

An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with MATH 732 and STAT 732.

CSCI 736. Advanced Intelligent Systems. 3 Credits.

This course acquaints students with intelligent systems to provide them with working knowledge for building these systems. The course describes expert systems, fuzzy logic, neural networks, evolutionary computation, swarm intelligence, and multi-agent systems.

CSCI 741. Algorithm Analysis. 3 Credits.

Algorithm design and analysis, asymptotic analysis, worst and average case, recurrences, generating functions, divide-and-conquer, the greedy method, search and traversal, backtracking, branch-and-bound.

CSCI 760. Dynamic Programming. 3 Credits.

Dynamic programming as an algorithm design method, formulating and solving problems using dynamic programming, deterministic and stochastic problems in OR and CS.

CSCI 765. Introduction To Database Systems. 3 Credits.

Basic database concepts, models, management facilities, data structures, storage structures, data definition languages, data manipulation languages, normalization, operator implementation algorithms, transactions, correctness, reliability, distribution, performance analysis.

CSCI 771. Software Development Project I. 3 Credits.

The first half of a two semester software development project done as the capstone activity of the Master of Software Engineering program. Student does a one page project proposal, a requirements specification document, and a design specification document. Prereq: CSCI 713, CSCI 715, CSCI 716, and CSCI 718.

CSCI 772. Software Development Project II. 3 Credits.

The second half of a two semester software development project required as the capstone activity of the Master of Software Engineering program. Student submits a test plan, complete testing results, the project source code, and a user manual. Prereq: CSCI 771.

CSCI 773. Foundations of the Digital Enterprise. 3 Credits.

This course covers current and emerging digital technologies, including web development, security, server management, and privacy.

CSCI 774. Topics of the Digital Enterprise. 3 Credits.

Topics in database, networks, cryptology, security, and software engineering as they apply to the digital enterprise. Recommended: CSCI 783.

CSCI 778. Computer Networks. 3 Credits.

Examination of computer networks using the ISO-OSI model as a framework. Practical and theoretical issues are explored in modems, codes, error, impairments, modulation, protocols, and interfaces.

CSCI 783. Topics In Software Systems. 3 Credits.

Includes an area of computer science not otherwise treated in computer science courses. Varies each time offered. May be repeated.

CSCI 787. Topics in Operations Research. 3 Credits.

Includes an area of operational research not considered in other courses. Varies each time offered. May be repeated.

CSCI 790. Graduate Seminar. 1-3 Credits.**CSCI 791. Temporary/Trial Topics. 1-5 Credits.****CSCI 793. Individual Study/Tutorial. 1-5 Credits.****CSCI 795. Field Experience. 1-15 Credits.****CSCI 796. Special Topics. 1-5 Credits.****CSCI 797. Master's Paper. 1-3 Credits.****CSCI 798. Master's Thesis. 1-10 Credits.****CSCI 834. Knowledge Based Systems. 3 Credits.**

Examination of types of knowledge-based systems, their powers and limitations. Students create their own knowledge-based system. Prereq: CSCI 724.

CSCI 835. Neural Networks. 3 Credits.

Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools. Prereq: CSCI 724. Cross-listed with PSYC 774 and IME 774.

CSCI 842. Algorithms and Complexity. 3 Credits.

Linear and nonlinear recurrences, algebraic problems, fast Fourier transforms, lower bound theory, computational geometry, the classes P and NP-completeness, Cook's theorem, NP-hard problems. Prereq: CSCI 741.

CSCI 845. Formal Methods for Software Development. 3 Credits.

The course is a high level course with the aim of formal representation to be able to formally assess characteristics of software. The formal representations are based on the theoretical foundations of computer sciences such as set theory, logic or graph theory. Prereq: CSCI 713.

CSCI 846. Development of Distributed Systems. 3 Credits.

This course is an advanced course in software engineering aiming at strategies and solutions of distributed systems. It assumes the knowledge of software engineering and particularly design and implementation of software systems, then builds on these concepts to how distributed systems are designed and implemented. Prereq: CSCI 713.

CSCI 847. Software Complexity Metrics. 3 Credits.

This course covers complexity metrics for the entire software lifecycle. Students gain experience in using requirements metrics, design metrics, program metrics, test metrics, and planning metrics. The effectiveness and limitations of metrics in all these areas are emphasized. Prereq: CSCI 718.

CSCI 848. Empirical Methods in Software Engineering. 3 Credits.

This course will cover the basics of Empirical Software Engineering. It will focus on the need for collecting metrics and building models as well as the concepts involved in design experiments. Prereq: CSCI 713.

CSCI 858. Bioinformatics Data Mining. 3 Credits.

Techniques and objectives of data mining for biological data with focus on diverse data sources including graphs, sequences and text. Preparation for research in bioinformatics with focus on functional genomics problems. Prereq: CSCI 732.

CSCI 859. Computational Methods in Bioinformatics. 3 Credits.

An introduction to computer science and operations research methods and algorithms that are used for analysis and solution of optimization and other models in bioinformatics.

CSCI 862. Network Flows. 3 Credits.

Theory and algorithms for network flow optimization including network representation data structures, basic change methods, maximum flow, shortest path, minimum cost problems, and generalized networks. Prereq: CSCI 653.

CSCI 866. Database System Internals. 3 Credits.

Transaction management, processing; correctness; recoverability; serializability (conflict and view); concurrency control (2PL, BTO, SGT, multiversion); recovery; distributed systems (correctness, recovery, replication); query processing and optimization. Prereq: CSCI 765.

CSCI 879. Advanced Data Mining. 3 Credits.

Advanced data mining includes in-depth coverage of Association Rule Mining (ARM), Classification and Clustering. The course is designed for those interested in doing research in data mining. Prereq: CSCI 679.

CSCI 880. Methods of Optimization. 3 Credits.

Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with MATH 880.

CSCI 885. Topics in Computer Architecture. 3 Credits.

Includes an area of computer architecture not considered in other courses. Varies each time offered. May be repeated.

CSCI 889. Topics in Theoretical Computer Science. 3 Credits.

Includes an area of theoretical computer science not considered in other courses. Varies each time offered. May be repeated.

CSCI 893. Individual Study/Tutorial. 1-5 Credits.**CSCI 899. Doctoral Dissertation. 1-15 Credits.**

Construction Management & Engineering (CM&E)

CM&E 111. Introduction to Construction Management and Engineering. 1 Credit.

This course provides an introduction to the roles and duties of construction professionals and the various career opportunities available to construction graduates. 1 lecture. F.

CM&E 194. Individual Study. 1-3 Credits.**CM&E 196. Field Experience. 1-15 Credits.****CM&E 199. Special Topics. 1-5 Credits.****CM&E 200. Construction Documents and Codes. 3 Credits.**

This course provides an introduction to construction working drawings; methods and materials of construction; and building codes. Prereq: Construction Management or Construction Engineering majors only.

CM&E 203. Building Construction: Methods and Materials. 3 Credits.

This course provides an introduction to the fundamentals of building construction, materials, and methods for residential and commercial construction. Prereq: CM&E 200 and students must be admitted to the Construction Management program and be at least sophomore standing.

CM&E 204. Construction Surveying. 3 Credits.

An introduction to basic surveying procedures and operations for construction site layout, alignment, and dimension control. Fieldwork topics include the operation of automatic levels, laser levels, transit theodolites, total stations, and GPS receivers. 2 one-hour lectures and 1 three-hour fieldwork. Prereq: MATH 105, Construction Management or Construction Engineering majors and at least sophomore standing.

CM&E 212. Construction Graphic Communications. 3 Credits.

This course provides an introduction to computer aided drafting (AutoCAD) for the creation of two-dimensional drawings related to the construction industry including a comprehensive final project layout using the techniques introduced in the course. Prereq: Construction Management or Construction Engineering major.

CM&E 240. Financial Cost Concepts for Construction Managers. 3 Credits.

This course provides an introduction to financial management and economic appraisal of construction projects. Topics include: accounting systems; financial documents; managing costs and cash flow; setting profit margins for bidding; time value of money; and economic evaluation of projects. Prereq: ECON 105 or both ECON 201 and ECON 202 and Construction Management or Construction Engineering major with at least sophomore standing.

CM&E 250. Construction Statics and Mechanics. 3 Credits.

This course provides an introduction to the principles of statics and strength of materials with a focus on the behavior of structural components and systems in the construction industry. Prereq: MATH 146 or higher, Construction Management major and at least sophomore standing.

CM&E 260. Soils and Foundations. 3 Credits.

This course provides a discussion of the aspects of engineering & physical properties of soils; stress; settlement; consolidation; slope stability; earth pressure; bearing capacity; drainage; pore pressure; and foundations. 2 lectures, 1 three-hour laboratory. Prereq: Construction Management majors only.

CM&E 291. Seminar. 1-3 Credits.**CM&E 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CM&E 294. Individual Study. 1-3 Credits.**CM&E 299. Special Topics. 1-5 Credits.****CM&E 301. Construction Technology and Equipment. 3 Credits.**

This course provides a discussion of construction techniques; analysis of equipment costs; production; methods of equipment selection; earthwork; dewatering systems; and aggregate production. Prereq: CM&E 240, admission to the Construction Management or Construction Engineering program and junior or senior standing. S.

CM&E 305. Pre-Construction Management. 3 Credits.

Looks into the construction management process, giving insight to how the construction professional interacts with other industry professionals. Overview of estimating, scheduling, and administrative functions of a project and the collaborative efforts required. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 315. Specifications and Contracts. 3 Credits.

This course provides a discussion of various types of construction contracts; contract administration; specifications using CSI and AIA documents. 3 lectures. Prereq: Admission to Construction Management or Construction Engineering program and Junior standing. F.

CM&E 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CM&E 380. Construction Estimating: Quantities and Costs. 3 Credits.

This course provides an introduction to the methods and techniques of conceptual and detailed construction estimating, including: quantity takeoffs; costs related to labor, materials, equipment, overhead and profit; and bidding strategies. Prereq: CM&E 200 and admission to the Construction Management or Construction Engineering program and at least junior standing.

CM&E 391. Seminar. 1-3 Credits.**CM&E 394. Individual Study. 1-3 Credits.****CM&E 397. Fe/Coop Ed/Internship. 1-4 Credits.****CM&E 399. Special Topics. 1-5 Credits.****CM&E 403. Scheduling and Project Control. 3 Credits.**

This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. Co-req or Prereq: CM&E 380. Prereq: Admission to the Construction Management or Construction Engineering program and at least junior standing. {Also offered for graduate credit - see CM&E 603}.

CM&E 405. Construction Support Operations. 3 Credits.

This course provides an introduction to construction safety, construction quality control management, and labor productivity. Prereq: STAT 330. {Also offered for graduate credit - see CM&E 605}.

CM&E 421. Electrical and Mechanical Construction. 3 Credits.

This course provides an introduction to electrical and mechanical systems, the design and construction procedures used, code-based requirements, interaction with general construction and structural components, and spatial requirements. Prereq: PHYS 211 or PHYS 251 or PHYS 252 and admission to the Construction Management program and at least senior standing. S.

CM&E 430. Land Development. 3 Credits.

This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. Prereq: CM&E 204, CM&E 212 and admission to the Construction Management program and at least senior standing. F {Also offered for graduate credit - see CM&E 630}.

CM&E 431. Sustainable Design and Construction. 3 Credits.

This course prepares students to become green building leaders and sustainability-focused citizens. This course involves the pre-selection and evaluation of a building to improve its sustainable performance through reviewing feasibility assessments, project management, implementation, audits, and documentation. Prereq: Admission to the Construction Management or Construction Engineering majors with at least junior standing.

CM&E 450. Steel Design and Construction. 3 Credits.

This course provides a discussion of the selection and design of structural steel systems and methods of construction assembly. 3 lectures. Prereq: CM&E 250 and admission to the Construction Management program and senior standing.

CM&E 453. Concrete Design and Construction. 3 Credits.

This course provides an introduction to the fundamental concepts of concrete construction from both design and construction perspectives. 2 one-hour lectures, 1 three-hour laboratory. Prereq: CM&E 250 and CM&E 260 and admission to the Construction Management program and senior standing. S.

CM&E 460. Infrastructure Management. 3 Credits.

This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for graduate credit - see CM&E 660.}.

CM&E 465. Bridge Engineering and Management. 3 Credits.

This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Admission to the Construction Management or Construction Engineering program and senior standing. {Also offered for graduate credit - see CM&E 665.}.

CM&E 475. Design of Site Erosion Control. 3 Credits.

This course provides an introduction to construction site erosion mechanisms; site hydrology and sediment transport; the selection, design, and maintenance of erosion control devices; and erosion control standards and regulations. Prereq: CE 309.

CM&E 486. Building HVAC Design. 3 Credits.

This course discusses design of the hardware necessary to satisfy a building's heating /cooling loads and ventilation. The hardware includes piping, pumps, diffusers, fans, ducts, cooling towers, and refrigeration equipment. Prereq: ME 485 and senior standing in Construction Engineering Program, or admission to Professional ME Program.

CM&E 487. Building Automation and Control Systems. 3 Credits.

This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. Prereq: CM&E 486 and ECE 301 and senior standing in Construction Engineering or Mechanical Engineering program. {Also offered for graduate credit - see CM&E 687.}

CM&E 488. Construction Management Capstone. 3 Credits.

This course focuses on applying knowledge and skills learned in the previous courses, a look into construction management process, interactions, marketing, estimating, scheduling, and other functions for a management plan for a construction project. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Management.

CM&E 489. Construction Design Capstone. 3 Credits.

This course focuses on the design and construction aspects of an actual construction project. Prereq: CM&E 380, CM&E 403 and senior standing in Construction Engineering.

CM&E 491. Seminar. 1-5 Credits.**CM&E 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CM&E 494. Individual Study. 1-5 Credits.**CM&E 496. Field Experience. 1-15 Credits.****CM&E 499. Special Topics. 1-5 Credits.****CM&E 603. Scheduling and Project Control. 3 Credits.**

This course provides a discussion on the theories, principles, and techniques of construction planning and scheduling with an emphasis on time management, costs, and resources through the preparation and analysis of network schedules. F {Also offered for undergraduate credit - see CM&E 403.}.

CM&E 605. Construction Support Operations. 3 Credits.

This course provides an introduction to construction safety, construction quality control management, and labor productivity. {Also offered for undergraduate credit - see CM&E 405.}.

CM&E 630. Land Development. 3 Credits.

This course provides an introduction to the practical applications of the planning, design, and construction phases of the land development process. F {Also offered for undergraduate credit - see CM&E 430.}.

CM&E 660. Infrastructure Management. 3 Credits.

This course provides an introduction to the methodologies, tools, and techniques of infrastructure management. Course topics focus on performance measures; deterioration modeling; life-cycle costs; optimization; budgeting; financial management; and policy analysis. Prereq: Junior standing. {Also offered for undergraduate credit - see CM&E 460.}.

CM&E 665. Bridge Engineering and Management. 3 Credits.

This course provides an introduction to the planning, design, construction, and management concepts of structural steel and reinforced concrete bridges, including: application of AASHTO LRFD specifications and latest developments in bridge management systems. Prereq: Senior standing. {Also offered for undergraduate credit - see CM&E 465.}.

CM&E 687. Building Automation and Control Systems. 3 Credits.

This course is about automation and direct digital control for programmable control of commercial building HVAC systems, including control technology; measuring technology; actuators; control valves and dampers; control of HVAC plants; data communication. {Also offered for undergraduate credit - see CM&E 487.}.

CM&E 696. Special Topics. 1-5 Credits.**CM&E 701. Construction Technology and Equipment. 3 Credits.**

This course provides an overview of advanced construction technology and equipment. It covers site improvement, industrial plants, pavements, tunnels, buildings, construction innovation, sustainability, equipment selection and optimization, replacement analysis, and mathematical modeling in construction.

CM&E 703. Advanced Project Planning and Control. 3 Credits.

This course provides a discussion on advanced and emerging theories, principles, tools and techniques of planning, monitoring, and control problems and uncertainties arising in construction projects. Prereq: CM&E 603 or equivalent.

CM&E 711. Construction Cost Estimating. 3 Credits.

This course provides an advanced discussion of quantity takeoffs; labor, materials, equipment, and overhead costs; profit; and bidding strategies for construction projects. F.

CM&E 712. Construction Management. 3 Credits.

This course provides advanced topics on responsibilities and issues that construction professionals typically encounter as they administer a construction project. F.

CM&E 715. Construction Specifications and Contracts. 3 Credits.

This course provides a discussion of the procedures used to prepare and administer construction specifications and contracts, including: Construction Specification Institute format, AIA Documents, General Conditions, and liabilities and incentives for various construction contracts.

CM&E 725. Decision Making and Risk Analysis. 3 Credits.

Decision-making and decision theory. Decision support systems, applied risk identification, and analysis in construction activities. Computer applications. Prereq: CM&E 403. 3 lectures. S.

CM&E 740. Financial and Economic Concepts for Construction Managers. 3 Credits.

This course provides an advanced discussion of financial management and the economic appraisal of construction projects, including: accounting systems, financial documents, managing costs and cash flow, setting profit margins for bidding, time value of money, and economic evaluation of projects.

CM&E 770. Construction Organization Processes. 3 Credits.

The course provides an overview of critical management skills and the analysis of organizational management systems. Theories of motivation, planning, leadership, organizational interactions, etc. as they relate to construction operations.

CM&E 785. Advanced Project Engineering and Management. 3 Credits.

This course provides a discussion of advanced topics in construction project engineering and management. Topics include: Geographic Information Systems (GIS) applications in construction, front end planning, and forensic engineering.

CM&E 790. Graduate Seminar. 1-5 Credits.**CM&E 793. Individual Study/Tutorial. 1-5 Credits.****CM&E 795. Field Experience. 1-15 Credits.****CM&E 797. Master's Paper. 1-3 Credits.****CM&E 798. Master's Thesis. 1-10 Credits.**

Counselor Education (CNED)

CNED 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CNED 710. Counseling Techniques. 3 Credits.

Basic principles and techniques in the counseling process. Emphasis given to counseling techniques from several counseling orientations.

CNED 711. Counseling Theory. 3 Credits.

Study of various theories and philosophies of counseling and therapy.

CNED 712. Counseling Across the Lifespan. 3 Credits.

Application of personality theory and the life stages to human behavior, family dynamics, and the counseling process.

CNED 713. Assessment Techniques. 3 Credits.

Techniques and procedures of studying the individual and diagnostic process in identifying client issues. Prereq: CNED 710 and CNED 711 or instructor approval.

CNED 714. Career Counseling and Testing. 3 Credits.

Study of theories of career development and the use of career information and testing in career counseling. Prereq: Admission to program or instructor approval.

CNED 715. Professional Orientation and Ethics. 3 Credits.

Introduction to dealing with professional and ethical responsibilities and multicultural issues in the counseling field. Prereq: Admission to CNED program.

CNED 716. Social and Cultural Foundations of Counseling. 3 Credits.

Issues and trends in counseling with multicultural and diverse populations within our society. Prereq: CNED 710, CNED 711.

CNED 720. Group Counseling. 3 Credits.

Study of group counseling principles appropriate to various counseling settings including schools, treatment centers, and agencies. Includes a group experience. Prereq: Admission to Counselor Education program.

CNED 723. Psychopathology and Diagnosis for Counselors. 3 Credits.

Psychopathology, abnormal psychology and the diagnosis of mental and emotional disorders will be studied. The diagnostic process and nomenclature, treatment, referral and prevention of mental and emotional disorders across the lifespan will be examined. Prereq: Admission to program or instructor approval.

CNED 728. Guidance Administration and Consulting. 3 Credits.

Role of administrators, counseling personnel, and teachers in the management of and consulting in K-12 counseling programs. Prereq: Admission to program or instructor approval.

CNED 729. Professional K-12 School Counseling. 3 Credits.

Overview of principles and functions of a K-12 school counseling program, and examination of K-12 school counseling issues and resources. Prereq: CNED 728.

CNED 730. Crisis and Trauma in Counseling Practice. 3 Credits.

Students study various forms of trauma, personal violence, crisis, and disasters. Appropriate counseling strategies and interventions are emphasized. Prereq: CNED 710, CNED 711.

CNED 731. Counseling Children and Adolescents. 3 Credits.

Counseling with children and adolescents including specific counseling strategies; mental, physical, and emotional development issues related to counseling. Prereq: CNED 710, CNED 711.

CNED 732. Family Counseling. 3 Credits.

Principles and techniques of family counseling, study of family dynamics, family systems, and theories of family counseling. Prereq: CNED 710, CNED 711.

CNED 734. Dynamics of Addiction. 3 Credits.

Study of the theories and scope of addiction from both the personal and social viewpoints with consideration given to the impact on the family. Prereq: CNED 710, CNED 711.

CNED 735. Clinical Mental Health Counseling. 3 Credits.

Professional knowledge, skills, and practices necessary to address a wide variety of circumstances within the clinical mental health counseling context including prevention and basic intervention skills and professional advocacy.

CNED 790. Graduate Seminar. 1-3 Credits.**CNED 791. Temporary/Trial Topics. 1-5 Credits.****CNED 793. Individual Study/Tutorial. 1-5 Credits.****CNED 794. Practicum/Internship. 1-8 Credits.****CNED 795. Field Experience. 1-15 Credits.****CNED 796. Special Topics. 1-5 Credits.****CNED 797. Master's Paper. 1-3 Credits.****CNED 798. Master's Thesis. 1-10 Credits.****CNED 863. Advanced Clinical Assessment, Report Writing, & Treatment Planning. 3 Credits.**

Advanced assessment procedures and abnormal psychology in clinical mental health settings are examined. Emphasis is on administering and interpreting assessments and integrating results into individualized reports including diagnoses, interventions, and treatment with measurable counseling outcomes. Prereq: CNED 713 and admission to the CNED doctoral or master's program.

CNED 866. Leadership and Advocacy in Counselor Education and Supervision. 3 Credits.

A seminar that addresses leadership and advocacy in counselor education and supervision. Prereq: Admission to the Counselor Education and Supervision PhD Program or permission from instructor.

CNED 867. Advanced Group Counseling. 3 Credits.

Theory and practice of group facilitation will be covered, building on the student's current expertise. Supervised practice in group work is included. Prereq: Admission to doctoral program or permission from instructor.

CNED 869. Instructional Theory and Practice in Counselor Education and Supervision. 3 Credits.

This course addresses theories pertaining to the practices of teaching and learning within the context of professional counseling. Students explore instructional models, educational techniques, and facilitate supervised learning experiences for master's level classes. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 870. Counselor Supervision. 3 Credits.

Theory and practice of counselor supervision. Major schools of thought in counselor supervision will be examined, as well as the process of supervision and relationship between supervisor and supervisee. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 871. Advanced Multicultural Practice in Counselor Education and Supervision. 3 Credits.

This course is designed for students to engage in the advanced study and practice of counseling with diverse populations. A major focus is advocacy for minority, non-dominant and oppressed populations. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 872. Advanced Counseling Theories. 3 Credits.

This course is designed for students to engage in the advanced study and practice of theory. Application of theory and models for case conceptualization and treatment of crisis and trauma are emphasized. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 876. Qualitative Research and Program Evaluation. 3 Credits.

Major approaches for qualitative research in counselor education are examined. Theory and practice issues are included, as well as processes for data analysis. Models and methods of program evaluation are included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 879. Quantitative and Survey Research. 3 Credits.

In-depth analysis of theory, method and technique for conceptualizing and conducting quantitative research in counseling and counselor education will be examined. Survey design and methodology will be included. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 880. Ethical and Legal Issues in Counselor Education and Supervision. 3 Credits.

This course is designed for students to engage in the advanced study of ethical and legal issues in counseling and in the practice of counselor education and supervision. Equivalent to EDUC 757. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 887. Professional Issues: Professional Development, Consultation and Publishing. 3 Credits.

A seminar that addresses the following: needs of practitioners for professional development, both as consumers and providers; theory and practice of consultation; and, the process of developing, writing and submitting manuscripts for publication. Prereq: Admission to doctoral program and completion of master's program courses.

CNED 890. Graduate Seminar. 1-5 Credits.**CNED 893. Individual Study/Tutorial. 1-5 Credits.****CNED 894. Practicum/Internship. 1-8 Credits.****CNED 899. Doctoral Dissertation. 1-15 Credits.**

Criminal Justice (CJ)

CJ 201. Introduction to Criminal Justice. 3 Credits.

Examination of the criminal justice system and process. Includes crime, lawmaking, criminality, prosecution, police, courts, and corrections.

CJ 210. Introduction to Policing. 3 Credits.

This course provides an overview of the purpose and function of the police in the United States.

CJ 226. Criminal Investigation. 3 Credits.

Exploration of criminal investigation principles, procedures, and techniques, including inferential reasoning, securing and preserving of evidence, surveillance, interviews and interrogations, report writing, and courtroom testimony. Prereq: Criminal Justice majors or minors only.

CJ 230. Criminology. 3 Credits.

Study of criminal behavior and the measurement of crime and victimization. Major theories of crime causation and specific types of crime will be examined.

CJ 270. Introduction to Corrections. 3 Credits.

This course provides an overview of the correctional system, including prisons and community sanctions, in the United States.

CJ 291. Seminar. 1-5 Credits.**CJ 299. Special Topics. 1-5 Credits.****CJ 310. Women and Policing. 3 Credits.**

This course provides an overview of women working as police officers in the United States. The course will provide the history, changing role, integration, and future of female police officers into this male dominated profession.

CJ 315. Federal Law Enforcement and Crime Policy. 3 Credits.

Examination of the history, development, current make-up, and jurisdiction of federal law enforcement in the United States, as well as the role of the federal government in setting national crime policy and the strategies employed. Cross-listed with POLS.

CJ 325. Applied Research Methods. 3 Credits.

This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Lecture. Co-req or Prereq: STAT 330. Cross-listed with POLS 325.

CJ 330. Criminal Law and Procedure. 3 Credits.

Examination of criminal law and procedure, including the elements of criminal offenses, search and seizure laws, rights of defendants and victims, and due process in criminal law. The criminal laws of North Dakota and Minnesota will be emphasized and explored. Prereq: admission to the Criminal Justice major or minor or declared Fraud Investigation minor.

CJ 354. Media, Crime and Justice in America. 3 Credits.

An overview of how mass media presents crime, criminals, and the American criminal justice system. Examines current research using a social constructionist theoretical perspective to better understand the implications of the media's presentation of crime in America.

CJ 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

CJ 391. Seminar. 1-5 Credits.**CJ 394. Individual Study. 1-5 Credits.****CJ 399. Special Topics. 1-5 Credits.****CJ 406. Crime and Delinquency. 3 Credits.**

Study of the nature and extent of juvenile delinquency. Analysis of causes of juvenile offending and an exploration of policies to combat delinquency. Prereq: Admission to the Criminal Justice professional program. Prereq or Co-req: CJ/POLS 325. {Also offered for graduate credit - see CJ 606.}.

CJ 407. Deviant Behavior. 3 Credits.

Analysis of the precursors, the processes, and the consequences of deviance in Western society. Prereq: SOC 110 or PSYC 111. Cross-listed with SOC 407. {Also offered for graduate credit - see CJ 607.}.

CJ 410. Police & Society. 3 Credits.

This course offers a theoretically-grounded and advanced examination of the role of police in society, with a focus on police effectiveness and accountability. Prereq: CJ 210 and admission to the CJ major or minor. Co-req: CJ 325 or POLS 325.

CJ 460. Criminal Court System. 3 Credits.

Analysis of the structure and function of the criminal court system in the United States, including the prosecutor, defense counsel, judge, and jury. Issues confronting the system are considered from historical, philosophical, and sociological perspectives. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {Also offered for graduate credit - see CJ 660.}.

CJ 461. Corrections. 3 Credits.

Analysis of institutional and community-centered corrections. Emphasis on historical, contemporary, and developing trends regarding structures, program content, and problems. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {Also offered for graduate credit - see CJ 661.}.

CJ 465. Gender, Race and Ethnicity in Criminal Justice. 3 Credits.

Analysis of roles and contributions of women and people of color in the criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and people of color. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program. {Also offered for graduate credit - See CJ 665.}.

CJ 489. Senior Capstone in Criminal Justice. 1 Credit.

Synthesis of criminal justice research, methods, and criminological theory. Prereq: Senior standing.

CJ 494. Individual Study. 1-5 Credits.**CJ 496. Field Experience. 1-15 Credits.****CJ 499. Special Topics. 1-5 Credits.****CJ 606. Crime and Delinquency. 3 Credits.**

Study of the nature and extent of juvenile delinquency. Analysis of causes of juvenile offending and an exploration of policies to combat delinquency. {Also offered for undergraduate credit - see CJ 406.}.

CJ 607. Deviant Behavior. 3 Credits.

Analysis of the precursors, the processes, and the consequences of deviance in Western society. Cross-listed with SOC 607. {Also offered for undergraduate credit - see CJ 407.}.

CJ 660. Criminal Court System. 3 Credits.

Analysis of the structure and function of the criminal court system in the United States, including the prosecutor, defense counsel, judge, and jury. Issues confronting the system are considered from historical, philosophical, and sociological perspectives. {Also offered for undergraduate credit - see CJ 460.}.

CJ 661. Corrections. 3 Credits.

Analysis of institutional and community-centered corrections. Emphasis on historical, contemporary, and developing trends regarding structures, program content, and problems. {Also offered for undergraduate credit - see CJ 461.}.

CJ 665. Gender, Race and Ethnicity in Criminal Justice. 3 Credits.

Analysis of roles and contributions of women and people of color in the criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and people of color. Restricted to accelerated master's students only {Also offered for undergraduate credit - See CJ 465.}.

CJ 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

CJ 696. Special Topics. 1-5 Credits.**CJ 702. Program Evaluation. 3 Credits.**

Examination of the development and implementation of criminal justice program/policy evaluation, including the techniques of applied research and practical considerations. Topics also include ethical issues, evaluation planning, process, impact and cost-benefits analyses, grant writing, and dissemination of findings. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 703. Advanced Criminology. 3 Credits.

Advanced study of the distribution of crime and the major theories of crime causation from an interdisciplinary perspective, including special attention to issues relating to the measurement, nature, and extent of crime in the US. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 707. Juvenile Corrections. 3 Credits.

Examination of the history of ideas about and responses to juvenile delinquency, the scope and nature historically and today, and the responses by various parts of the juvenile justice system, as well as responses by other social institutions such as the family, community and schools. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 709. Criminal Justice Policy. 3 Credits.

Examination of concepts related to the development, implementation, and evaluation of public policy as it relates to the criminal justice system, including the history, development and operation of policing, courts/sentencing, corrections, crime prevention, offender rehabilitation, and issues related to drugs and crime and race and crime. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 721. Individual Theories of Crime. 3 Credits.

Review of historical and contemporary individual theories of crime. Discussion of the assumptions, causes, and policy implications of criminological theories. Prereq: CJ 703. Graduate standing in Criminal Justice or instructor approval.

CJ 722. Structural Theories of Crime. 3 Credits.

Review of historical and contemporary structural theories of crime, including criteria of good theory, the assumptions of various criminological theories, and the similarities and differences in theories. Prereq: CJ 703. Graduate standing in Criminal Justice or instructor approval.

CJ 732. Applied Interpretation of Criminal Justice Methods. 3 Credits.

This class is intended to provide an advanced interpretation of criminal justice methodologies. This course examines how criminal justice research employs various methodologies to study how/when/why people commit or recommit crime. Using research in the fields of criminal justice and criminology, the class will focus on interpreting the methodologies that examine continuous, dichotomous, categorical, and count endogenous variables under normal and skewed distribution assumptions. Prereq: STAT 725. Restrictions: Enrolled in Masters or Ph.D. Criminal Justice Program.

CJ 733. Issues in Institutional Corrections. 3 Credits.

Course examining the various issues in adult prisons and jails in the United States. Topics include male and female inmates' life in prison, violence, prisoners' rights, management and staff issues, and differences between prisons and jails.

CJ 734. Advanced Criminal Justice Methods. 3 Credits.

Provides an examination of the research process. Explores how criminologists conduct research, pitfalls of research and importance of discovery and application. Prereq: Undergraduate methods course in the social or behavioral sciences and a statistics course.

CJ 750. Violence. 3 Credits.

Examination of various aspects of criminal violence, including various social settings (e.g., community, domestic, and school) with attention to the causes, consequences, moderating factors and proposed solutions associated with violent criminal behavior. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 752. Crime and the Life Course. 3 Credits.

The life course will be examined as a theoretical orientation, a research methodology, and as an empirical field of study with special reference to crime and deviance. Key conceptual and research issues will be analyzed and discussed.

CJ 754. Police and Society. 3 Credits.

This course provides graduate students with an overview of US law enforcement. Topics covered include officer use of discretion, officer behavior, organizational function, and delivery of police services and will be examined from an advanced research orientation.

CJ 755. Administrative Policing. 3 Credits.

Organizational theory, leadership, communication, labor relations, and crisis management in police administration. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 759. Advanced Research Design in Criminal Justice. 3 Credits.

This course provides an overview of research design used in criminal justice and criminological research. Students will learn how to critique research designs that are most commonly used in criminal justice research. Prereq: CJ 734.

CJ 760. Police and Race Issues. 3 Credits.

Provides an in-depth, historical, and contemporary view of the police and race issues in the United States. Discussions on diversity, use of force, racial profiling, and citizen complaints.

CJ 761. Police Effectiveness. 3 Credits.

Examines effectiveness of police delivery services in the U.S. Examines theories and scrutinizes factors that are associated with police effectiveness.

CJ 762. Community Corrections. 3 Credits.

Evaluation of practices, issues, and trends in community corrections. Focus on probation, parole, halfway houses, and other community alternatives to incarceration. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 763. Correctional Rehabilitation. 3 Credits.

Examines issues related to the implementation and effectiveness of various correctional treatment approaches and programs. In-depth examination of the history, purpose and common targets of correctional treatment interventions. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 764. Punishment and Society. 3 Credits.

Examines the use of punishment in American society. This course is designed as a seminar to discuss past and current literature on the evolution of punishment, the purposes of punishment, and specific types of punishment.

CJ 765. Classics in Policing. 3 Credits.

This course will provide students with an overview of classic writings in policing which provide the foundation for contemporary policing research. Students will learn how policing research has advanced methodologically and theoretically since the first studies were conducted.

CJ 768. Gender and Justice. 3 Credits.

Examination of the role of gender in crime and the criminal justice system, including the changing roles of men and women in society, differential involvement in criminal behavior, and differential criminal justice response. Prereq: Graduate standing in Criminal Justice or instructor approval.

CJ 793. Individual Study. 1-5 Credits.**CJ 794. Practicum/Internship. 1-8 Credits.****CJ 795. Field Experience. 1-15 Credits.****CJ 796. Special Topics. 1-5 Credits.****CJ 797. Master's Paper. 1-3 Credits.****CJ 798. Master's Thesis. 1-10 Credits.****CJ 893. Individual Study. 1-5 Credits.****CJ 899. Doctoral Dissertation. 1-15 Credits.**

Economics (ECON)

ECON 105. Elements of Economics. 3 Credits.

Study of demand and supply, competitive and noncompetitive markets, concepts of national income, unemployment, inflation, money, and fiscal and monetary policies. This course cannot be substituted for ECON 201 and ECON 202.

ECON 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

ECON 194. Individual Study. 1-3 Credits.**ECON 196. Field Experience. 1-15 Credits.****ECON 199. Special Topics. 1-5 Credits.****ECON 201. Principles of Microeconomics. 3 Credits.**

Nature, method, and scope of economic analysis; economic scarcity, resources, specialization of labor; supply-demand analysis; production and cost analysis; product and resource market structures; distribution of income; international trade.

ECON 202. Principles of Macroeconomics. 3 Credits.

Aggregate income and employment analysis; business cycles, unemployment, inflation and economic growth; fiscal policy; money and monetary policy; the U.S. economy and the world economy.

ECON 205. Market Values. 3 Credits.

Fundamental to both business and economics is the creation of value in the marketplace. This course examines competing economic systems (capitalist vs socialist) and their ability to create value for society. The course engages modern texts in addition to classical texts from Adam Smith and Karl Marx. The role of entrepreneurs and business persons in contributing to a flourishing society will be emphasized. In addition to in class discussions, lectures and activities, you will be expected to participate in several experiences outside of the classroom.

ECON 291. Seminar. 1-3 Credits.**ECON 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 294. Individual Study. 1-5 Credits.**ECON 299. Special Topics. 1-5 Credits.****ECON 324. Money and Banking. 3 Credits.**

Institutional and theoretical framework of the financial structure including the banking system, Federal Reserve, money markets, and international monetary systems. Prereq: ECON 201, ECON 202.

ECON 341. Intermediate Microeconomics. 3 Credits.

Analysis of markets in terms of efficiency, resource use, and economic welfare. Prereq: ECON 201, ECON 202, MATH 144 (or MATH 165).

ECON 343. Intermediate Macroeconomics. 3 Credits.

Analysis of national output, business cycles, inflation, unemployment rates, interest rates, exchange rates, impact of monetary and fiscal policies, and economic growth. Prereq: ECON 201, ECON 202.

ECON 356. History of Economic Thought. 3 Credits.

Development of economic thought from philosophical foundations to the Neoclassical School. Prereq: ECON 201, ECON 202, ENGL 120.

ECON 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ECON 391. Seminar. 1-3 Credits.**ECON 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 394. Individual Study. 1-3 Credits.**ECON 397. Cooperative Education. 1-4 Credits.****ECON 399. Special Topics. 1-5 Credits.****ECON 402. Economics of Entrepreneurship. 3 Credits.**

Study of the economic functions of entrepreneurs, how entrepreneurs increase market efficiency through bearing risk in ownership of resources, and how incentives affect and are affected by entrepreneurship and private enterprises operating in economic and political systems. Prereq: ECON 201 and ECON 202. {Also available for graduate credit - see ECON 602.}

ECON 410. Econometrics. 3 Credits.

Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. Prereq: ECON 341, STAT 330. {Also offered for graduate credit - see ECON 610.}

ECON 411. Computational Economics. 3 Credits.

Economic computation for modeling, analysis, and data management, including an introduction of rudimentary elements of programming required for economic computation. Prereq: ECON 201 or ECON 202 and STAT 330 or STAT 367. {Also offered for graduate credit - see ECON 611.}

ECON 440. Game Theory and Strategy. 3 Credits.

This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. Recommended Prereq: ECON 341 or BUSN 487. Prereq: ECON 201, MATH 144 (or MATH 165), and STAT 330 (or STAT 367). {Also offered for graduate credit - see ECON 640.}.

ECON 461. Economic Development. 3 Credits.

Analysis of the main causes of economic development. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 661.}.

ECON 465. Labor Economics. 3 Credits.

Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 665.}.

ECON 470. Public Economics. 3 Credits.

The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 670.}.

ECON 472. International Trade. 3 Credits.

Theories of international trade, payments, and foreign exchange markets. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 672.}.

ECON 475. Health Economics. 3 Credits.

Introduction to the application of economics to healthcare and medical care issues including demand and supply of healthcare, health insurance, health quality and safety, and the role of regulations within a healthcare system. Prereq: ECON 341. {Also offered for graduate credit - See ECON 675.}.

ECON 476. Monetary Theory and Policy. 3 Credits.

Analysis of relationships among money, credit, employment, price stability, and national monetary policy. Prereq: ECON 324 or ECON 343. {Also offered for graduate credit - see ECON 676.}.

ECON 480. Industrial Organization. 3 Credits.

Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. Prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 680.}.

ECON 481. Natural Resource Economics. 3 Credits.

Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format. Prereq: ECON 201.

ECON 482. Environmental Economics. 3 Credits.

Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. Prereq: ECON 341 or ECON 481 or BUSN 487. {Also offered for graduate credit - see ECON 682.}.

ECON 491. Seminar. 1-5 Credits.**ECON 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECON 494. Individual Study. 1-5 Credits.**ECON 496. Field Experience. 1-15 Credits.**

Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ECON 499. Special Topics. 1-5 Credits.**ECON 602. Economics of Entrepreneurship. 3 Credits.**

Study of the economic functions of entrepreneurs, how entrepreneurs increase market efficiency through bearing risk in ownership of resources, and how incentives affect and are affected by entrepreneurship and private enterprises operating in economic and political systems. {Also available for undergraduate credit - see ECON 402.}.

ECON 610. Econometrics. 3 Credits.

Introduction to estimation, hypothesis-testing techniques and econometric applications in economics, with emphasis on ordinary least squares regression analysis. Use of econometric software reinforces econometric theory and methods through applications to economic data. {Also offered for undergraduate credit - see ECON 410.}.

ECON 611. Computational Economics. 3 Credits.

Economic computation for modeling, analysis, and data management, including an introduction of rudimentary elements of programming required for economic computation. {Also offered for undergraduate credit - see ECON 411.}.

ECON 640. Game Theory and Strategy. 3 Credits.

This course is an introduction to the economic theory of games: a set of tools used to analyze the interactions among strategic decision-makers. {Also offered for undergraduate credit - see ECON 440.}.

ECON 661. Economic Development. 3 Credits.

Analysis of the main causes of economic development. {Also offered for undergraduate credit - see ECON 461.}.

ECON 665. Labor Economics. 3 Credits.

Theoretical analysis and survey of empirical studies relating to labor markets, human capital formation, and nature and causes of unemployment. {Also offered for undergraduate credit - see ECON 465.}.

ECON 670. Public Economics. 3 Credits.

The economics of the public sector, including: taxation, expenditure, public goods, externalities, and program evaluation. The course will be taught from both a traditional perspective and through the lens of political economics. {Also offered for undergraduate credit - see ECON 470.}.

ECON 672. International Trade. 3 Credits.

Theories of international trade, payments, and foreign exchange markets. {Also offered for undergraduate credit - see ECON 472.}.

ECON 675. Health Economics. 3 Credits.

Introduction to the application of economics to healthcare and medical care issues including demand and supply of healthcare, health insurance, health quality and safety, and the role of regulations within a healthcare system. {Also offered for undergraduate credit - See ECON 475.}.

ECON 676. Monetary Theory and Policy. 3 Credits.

Analysis of relationships among money, credit, employment, price stability, and national monetary policy. {Also offered for undergraduate credit - see ECON 476.}.

ECON 680. Industrial Organization. 3 Credits.

Structural analysis of American industry in terms of the markets for business enterprise. Analysis of antitrust policy and its application to large corporations. {Also offered for undergraduate credit - see ECON 480.}.

ECON 681. Natural Resource Economics. 3 Credits.

Application of economic tools to evaluate natural resource policies. Concepts such as property rights, non-market goods, resource allocation over time, externalities, open access, and public goods are discussed in an intermediate micro-economics and calculus-based format.

ECON 682. Environmental Economics. 3 Credits.

Application of economic tools to evaluate environmental policies. Topics include cost benefit analysis, regulatory versus market pollution control approaches, environmental damage assessment, and green accounting. {Also offered for undergraduate credit - see ECON 482.}.

ECON 696. Special Topics. 1-5 Credits.**ECON 710. Advanced Econometrics. 3 Credits.**

Advanced econometric methods applied to time series and panel data analysis, limited dependent variable models, maximum likelihood estimation, systems estimation, and discrete choice models. Prereq: ECON 610.

ECON 762. New Institutional Economics. 3 Credits.

This course introduces theoretical and applied studies examining the role of formal and informal institutions that make economic interaction possible. Topics include property rights, contracts, transaction costs, informal norms, culture, and conventions.

ECON 793. Individual Study/Tutorial. 1-5 Credits.

Education (EDUC)

EDUC 120. Peer Counseling. 1 Credit.

Designed to bring peer counseling theory and practice together in helping freshmen overcome the hurdles of the first year. May be repeated.

EDUC 121. Approaches to Critical Reading. 1 Credit.

A developmental reading program designed to help the student improve in reading efficiency.

EDUC 123. Study Skills. 1 Credit.

Assistance in the development of study skills necessary for academic achievement through learning and practice.

EDUC 194. Individual Study. 1-5 Credits.**EDUC 196. Field Experience. 1-15 Credits.****EDUC 199. Special Topics. 1-5 Credits.****EDUC 291. Seminar. 1-3 Credits.****EDUC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 294. Individual Study. 1-5 Credits.**EDUC 299. Special Topics. 1-5 Credits.****EDUC 300. Orientation to Elementary Teaching. 2 Credits.**

Overview of elementary education with special emphasis on the role of music and physical education. Required for K-12 certification in music and physical education.

EDUC 321. Introduction to Teaching. 3 Credits.

Nature and aims of education at middle and high school levels; social, philosophical, historical, curricular, and political foundations in a changing multicultural society; analyze teaching as a career choice, initiate teacher education program exit portfolio.

EDUC 322. Educational Psychology. 3 Credits.

Strong emphasis on educational research; review of human development; emphasis on developmental domains and span of students from young child through high school learning theories, learning styles, and individual student differences including gender, exceptionalities, culture.

EDUC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

EDUC 391. Seminar. 1-3 Credits.**EDUC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 394. Individual Study. 1-5 Credits.**EDUC 399. Special Topics. 1-5 Credits.****EDUC 416. Teacher Education in International Comparative Perspective. 2 Credits.**

Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for graduate credit - see EDUC 616}.

EDUC 420. STEM Philosophy for Educators. 3 Credits.

This course focuses on what STEM education is, why it is effective, and how to relate STEM education to the core disciplines and beyond. {Also offered for graduate credit - see EDUC 620.}.

EDUC 421. STEM Curriculum for Educators. 3 Credits.

This course focuses integrated use of the Engineering Design Process in STEM education through trans-disciplinary unit implementation and assessment. {Also offered for graduate credit - see EDUC 621.}.

EDUC 422. STEM Methods for Educators. 2 Credits.

This course focuses on how to manage and assess 21st century learning in a STEM environment. Prereq: EDUC 420. Co-req: EDUC 496, STEM Field Experience (2 credits, 60 hours). {Also offered for graduate credit - see EDUC 622.}.

EDUC 423. STEM Strategies for Educators. 2 Credits.

This course focuses on STEM curriculum resources for development of trans-disciplinary STEM units of study in the K-12 classroom. Prereq: EDUC 420. {Also offered for graduate credit - see EDUC 623.}.

EDUC 451. Instructional Planning, Methods and Assessment. 3 Credits.

Planning for teaching, implementing strategies, and assessing student learning. Includes microteaching activities, instructional strategies for middle and high school classrooms, data driven decision-making, assessment design, classroom technology, and other resources for the 21st century classroom. Prereq: EDUC 321, EDUC 322, admission to School of Education.

EDUC 452. Assessment and Testing of Culturally Diverse Students. 2 Credits.

Theories and strategies for selecting and implementing a variety of assessments focused on the needs of English Language Learners. Practice in using assessment results to adjust classroom instruction accordingly. Prereq: Admission to School of Education. {Also offered for graduate credit - see EDUC 652.}.

EDUC 453. Foundations of Teaching English Language Learners. 1 Credit.

This course will explore ELL issues and trends and identify challenges ELLs face in school, outlining what educators need to know to address each learner's needs. Co-req: EDUC 481 and EDUC 496, ELL Field Experience (1 credit). {Also offered for graduate credit - see EDUC 653.}.

EDUC 454. Linguistics for Teachers of English Language Learners. 3 Credits.

This course explores language acquisition and how differences in the structure of languages affect English language learners. {Also offered for graduate credit - see EDUC 654.}.

EDUC 455. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.

This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 454. {Also offered for graduate credit - see EDUC 655.}.

EDUC 461. Introduction to Special Education. 3 Credits.

Develops skills and knowledge for recognizing and effectively teaching students with various disabilities in the K-12 setting. Examines relevant laws, educational service delivery models, curricular planning approaches, and instructional adaptations. Ten hours of field experience is required. Prereq: EDUC 321 and admission into the School of Education. {Also offered for graduate credit - See EDUC 661.}.

EDUC 463. Inclusive Instructional Planning Across the K-12 Setting. 3 Credits.

Curriculum development aligned with general education content for students with disabilities. Identifying appropriate IEP goals, supplementary aids and services, and service coordination in K-12 inclusive school contexts will be emphasized. Ten hours of field experience is required. Prereq: EDUC 321 and admission into the School of Education. {Also offered for graduate credit - See EDUC 663.}.

EDUC 471. Middle School Philosophy & Curriculum. 2 Credits.

Educational foundations for middle schools, essential to meeting young adolescent needs and improving their learning. Identifies and expands central ideas in philosophy, historical background, curriculum, facilitating learning, organizational structures and practices, assessment, and planning. Prereq: EDUC 451. Admission to the School of Education is required. {Also offered for graduate credit - see EDUC 671.}.

EDUC 472. Middle Level Teaching Methods. 3 Credits.

Instruction and guidance in the design, implementation, and assessment of teaching strategies adapted to young adolescents. Prereq: EDUC 451. Admission to the School of Education is required. {Also offered for graduate credit - see EDUC 672.}.

EDUC 475. Reading in the Content Area. 2 Credits.

Introduction to the relevance and need for incorporating reading and developing reading skills in middle and high school classrooms.

EDUC 481. Classroom Practice Methods of Teaching I.: 2-3 Credits.

Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education.

EDUC 482. Classroom Practice/Methods of Teaching II.: 2-3 Credits.

Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481. {Also offered for graduate credit - see EDUC 682.}.

EDUC 483. Classroom Practice/Methods of Teaching III.: 2 Credits.

Specialized methods and classroom practices appropriate to the specific subject area. May be repeated. Prereq: EDUC 321, EDUC 322, admission to School of Education, EDUC 481, EDUC 482. {Also available for graduate credit - see EDUC 683P.}.

EDUC 485. Student Teaching Seminar. 1 Credit.

Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 389, EDUC 451, EDUC 483, EDUC 486. Coreq: EDUC 487. {Also offered for graduate credit - see EDUC 685P.}.

EDUC 486. Classroom Management for Diverse Learners. 3 Credits.

Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. Prereq: EDUC 321, EDUC 322, admission to School of Education. {Also offered for graduate credit - see EDUC 686.}.

EDUC 487. Student Teaching. 9 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar. May be repeated. Prereq: EDUC 321, EDUC 322, EDUC 389, EDUC 451, EDUC 481, EDUC 482, EDUC 483, EDUC 486, admission to School of Education. Coreq: EDUC 485. {Also offered for graduate credit - see EDUC 687P.}.

EDUC 488. Applied Student Teaching. 3 Credits.

Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see EDUC 688P.}.

EDUC 489. Teaching Students of Diverse Backgrounds. 3 Credits.

This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. Prereq: EDUC 321, EDUC 322 and admission to the School of Education. {Also offered for graduate credit - see EDUC 689.}.

EDUC 491. Seminar. 1-5 Credits.**EDUC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 494. Individual Study. 1-5 Credits.**EDUC 496. Field Experience. 1-15 Credits.****EDUC 499. Special Topics. 1-5 Credits.****EDUC 616. Teacher Education in International Comparative Perspective. 2 Credits.**

Exploring teacher education in international contexts by comparing approaches to program development, examining curriculum characteristics, analyzing policies and investigating practices of teaching and learning in different countries. {Also available for undergraduate credit - see EDUC 416.}

EDUC 620. STEM Philosophy for Educators. 3 Credits.

This course focuses on what STEM education is, why it is effective, and how to relate STEM education to the core disciplines and beyond. {Also offered for undergraduate credit - see EDUC 420.}.

EDUC 621. STEM Curriculum for Educators. 3 Credits.

This course focuses integrated use of the Engineering Design Process in STEM education through trans-disciplinary unit implementation and assessment. {Also offered for undergraduate credit - see EDUC 421.}.

EDUC 622. STEM Methods for Educators. 2 Credits.

This course focuses on how to manage and assess 21st century learning in a STEM environment. Prereq: EDUC 620. Co-req: EDUC 695, STEM Field Experience (2 credits, 60 hours). {Also offered for undergraduate credit - see EDUC 422.}.

EDUC 623. STEM Strategies for Educators. 2 Credits.

This course focuses on STEM curriculum resources for development of trans-disciplinary STEM units of study in the K-12 classroom. Prereq: EDUC 620. {Also offered for undergraduate credit - see EDUC 423.}.

EDUC 651P. Instructional Planning, Methods and Assessment. 3 Credits.

Planning for teaching, implementing strategies, and assessing student learning. Includes microteaching activities, instructional strategies for middle and high school classrooms, data driven decision-making, assessment design, classroom technology, and other resources for the 21st century classroom.

EDUC 652. Assessment and Testing of Culturally Diverse Students. 2 Credits.

Theories and strategies for the assessment of second language competence. Practice in using the Wida Access Assessment in order to guide formal and informal classroom instruction along content assessment. Prereq: Admission to School of Education. {Also offered for undergraduate credit - see EDUC 452.}.

EDUC 653. Foundations of Teaching English Language Learners. 1 Credit.

This course will explore ELL issues and trends and identify challenges ELLs face in school, outlining what educators need to know to address each learner's needs. Co-req: EDUC 681 and EDUC 695, ELL Field Experience (1 credit). {Also offered for undergraduate credit - see EDUC 453.}.

EDUC 654. Linguistics for Teachers of English Language Learners. 3 Credits.

This course explores language acquisition and how differences in the structure of languages affect English language learners. {Also offered for undergraduate credit - see EDUC 454.}.

EDUC 655. Socio-Psycho-Linguistics for Teachers of English Language Learners. 3 Credits.

This course will explore how language shapes culture and vice versa, considering how assumptions, prejudices and biases toward varying language affect the classroom and ELLs. Prereq: EDUC 654. {Also offered for undergraduate credit - see EDUC 455.}.

EDUC 661. Introduction to Special Education. 3 Credits.

Develops skills and knowledge for recognizing and effectively teaching students with various disabilities in the K-12 setting. Examines relevant laws, educational service delivery models, curricular planning approaches, and instructional adaptations. Ten hours of field experience is required. Prereq: Admission to graduate program. {Also offered for undergraduate credit - See EDUC 461.}.

EDUC 663. Inclusive Instructional Planning Across the K-12 Setting. 3 Credits.

Curriculum development aligned with general education content for students with disabilities. Identifying appropriate IEP goals, supplementary aids and services, and service coordination in K-12 inclusive school contexts will be emphasized. Ten hours of field experience is required. {Also available for undergraduate credit - see EDUC 463.}.

EDUC 671. Middle School Philosophy and Curriculum. 2 Credits.

Educational foundations for middle schools, essential to meeting young adolescent needs and improving their learning. Identifies and expands central ideas in philosophy, historical background, curriculum, facilitating learning, organizational structures and practices, assessment, and planning. {Also offered for undergraduate credit - see EDUC 471.}.

EDUC 672. Middle Level Teaching Methods. 3 Credits.

Instruction and guidance in the design, implementation, and assessment of teaching strategies adapted to young adolescents. {Also offered for undergraduate credit - see EDUC 472.}.

EDUC 681P. Classroom Practice/Methods of Teaching I. 2-3 Credits.

Specialized methods and classroom practices appropriate to the specific subject area.

EDUC 682. Classroom Practtice/Methods of Teaching II. 2-3 Credits.

Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 482.}.

EDUC 683P. Classroom Practice/Methods of Teaching III. 2-3 Credits.

Specialized methods and classroom practices appropriate to the specific subject area. {Also offered for undergraduate credit - see EDUC 483.}.

EDUC 685P. Student Teaching Seminar. 1 Credit.

Orientation to student teaching. Analysis of professional issues and concerns associated with education. Prereq: EDUC 689P, EDUC 651P, EDUC 683P, EDUC 686P. Coreq: EDUC 687P. {Also offered for undergraduate credit - see EDUC 485.}.

EDUC 686. Classroom Management for Diverse Learners. 3 Credits.

Teacher candidates develop a plan to establish an effective management system encompassing the total classroom environment. {Also offered for undergraduate credit - see EDUC 486.}.

EDUC 687P. Student Teaching. 9 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 689P, EDUC 651P, EDUC 681P, EDUC 682P, EDUC 683P, EDUC 686P. Coreq: EDUC 685P. {Also offered for undergraduate credit - see EDUC 487.}.

EDUC 688P. Applied Student Teaching. 3 Credits.

Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Coreq: EDUC 685P, EDUC 687P. Cross-listed with H&CE 688P. {Also offered for undergraduate credit - see EDUC 488.}.

EDUC 689. Teaching Students of Diverse Backgrounds. 3 Credits.

This class places emphasis on cultural diversity and teaching diverse students including Native Americans. Strategies for creating learning environments that contribute to positive human relationships, and strategies for teaching and assessing diverse learners are included. {Also offered for undergraduate credit - see EDUC 489.}.

EDUC 690. Graduate Seminar. 1-3 Credits.**EDUC 692. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

EDUC 695. Field Experience. 1-15 Credits.**EDUC 696. Special Topics. 1-5 Credits.****EDUC 702. Statistics In Educational Research. 3 Credits.**

Basic theory, techniques for using descriptive and inferential statistics, application of appropriate statistical procedures, analysis and interpretation of results, and practice in the reporting of the results in appropriate formats for scholarly papers and presentations.

EDUC 703. Research, Measurement and Program Evaluation. 3 Credits.

Methodology and design of research studies; organization, reporting analysis, and interpretation of research.

EDUC 704. Collegiate Environments. 3 Credits.

The purpose of this course is to understand college student populations, campus environments, and their interactions. By exploring the influences of campus environments on students' experiences, as well as how students influence environments, this course will provide opportunities to learn how to enhance campus environments to maximize student success. Additionally, integrating concepts and issues related to safety, inclusion, equity, campus climate, and retention, is imperative to understanding how to build environments that are responsive to the increasingly diverse characteristics of U.S. college students.

EDUC 706. Theories of College Student Development. 3 Credits.

This course examines how college students develop and learn. It is designed to introduce graduate students to major theoretical perspectives, the scholarship based on those perspectives, and how each can be used to design educational policies and practices that promote college student learning and development.

EDUC 707. Organization and Administration of Higher Education. 3 Credits.

This course deals with the organization and administration of higher education and the current and evolving problems and possibilities for higher education. Prereq: Admission to graduate program in Education.

EDUC 708. Higher Education Student Affairs and Enrollment Management. 3 Credits.

The purpose of this course is to teach about the role of student affairs professionals in schools, colleges, and other educational organizations, including recruitment, selection, orientation, development, compensation, and evaluations. Prereq: Admission to a graduate program in Education.

EDUC 709. Financing Higher Education. 3 Credits.

This course provides funding theories and procedures necessary to develop and maintain financing for higher education institutions. Prereq: Admission to a graduate program in Education.

EDUC 710. Philosophy of Education. 2 Credits.

Major philosophical concepts and principles of education from Plato to the present.

EDUC 712. Social, Cultural and Political Dimensions of Schools. 3 Credits.

Social processes and interaction among diverse populations in educational settings. Relationship of schools to society.

EDUC 714. History of American Education. 2 Credits.

Historical and intellectual development of education in the United States from the colonial period to the present.

EDUC 715. The Superintendency. 2 Credits.

This course deals with examining the role and functions of the public school district administrator.

EDUC 720. Supervision of Student Teachers. 2 Credits.

Planning and carrying out effective supervision techniques when supervising student teachers in respective subjects.

EDUC 724. Advanced Educational Psychology. 3 Credits.

Principles of effective human learning. Discussion of learning theories, the teacher as a director of learning experiences, and factors influencing students representing a variety of cultures and abilities in the educational setting.

EDUC 728. Instructional Technology for Teaching and Learning. 3 Credits.

This course provides an advanced understanding of technology concepts and contemporary computer-based programs for the teaching and learning processes. Prereq: Admission to doctoral program.

EDUC 730. Leadership, Planning and Organizational Behavior. 3 Credits.

Introduction to models of educational leadership including organizational structure, theory, and leadership styles. Consideration of concepts, problems, and issues in administration.

EDUC 731. Educational Law and Policy. 3 Credits.

Examination of the legislative and judicial actions affecting the public schools. Consideration is given to contemporary legal issues for teachers, administrators, and boards.

EDUC 732. Curriculum, Instruction and Learning Theory. 3 Credits.

Investigation of curricular decision-making and program evaluation strategies as they affect the educational program. Problem-solving skills are presented through theory and simulation. Prereq: EDUC 730.

EDUC 733. Technology and Information Systems. 3 Credits.

Provides an understanding of selected computer applications for educational administrators at the building and district office levels.

EDUC 734. Personal Communication & Ethics. 3 Credits.

Prepares aspiring school leaders to plan for their personal and professional development and to understand and use the principles of communication, ethics, and values.

EDUC 735. Personnel, Supervision and Staff Development. 3 Credits.

Specific techniques and systems to supervise instruction. Review of interpersonal communication and group process skills as applied to administrative supervision. Prereq: EDUC 730.

EDUC 736. Policy and Educational Finance. 3 Credits.

Provides school leaders with an understanding of managing and allocating resources in a political climate in which policy decisions are based on historical resource allocations.

EDUC 738. Administration of K-12 Schools. 3 Credits.

The course provides school leaders with common elements of leadership and management as they apply to the K-12 principalship. Practical applications in the K-12 setting will be considered. Prereq: EDUC 730.

EDUC 739. Administration of Secondary Schools. 2 Credits.

Common elements of leadership as they apply to the principalship. Consideration of practical applications in a secondary school setting. Prereq: EDUC 730.

EDUC 742. Elementary School Curriculum. 2 Credits.

History, development, evaluation, and revision of the curriculum. Review of recent research in elementary school curriculum.

EDUC 743. Secondary School Curriculum. 2 Credits.

Study of contemporary curriculum patterns with emphasis on curricular construction and evaluation.

EDUC 750. Reflective Practice and Research in Education. 3 Credits.

An examination of teaching and professional practice based on reflective practice. Analyze educational research as related to and informs practice.

EDUC 751. Students and Their Learning. 3 Credits.

Exploration of student differences and ways of adjusting teaching practice to meet individual needs and promote the equitable treatment of students. Application of learning theories to educate the whole child (cognitive, affective, social).

EDUC 752. Curriculum Design and Delivery. 3 Credits.

An inquiry-based course for the reflective practitioner to develop deep understandings of curriculum content emphasized by state and national standards documents and to acquire an effective repertoire of instructional skills.

EDUC 753. Managing/ and Monitoring Learning. 3 Credits.

This course is based on the concept that assessment drives instruction. A working definition of student learning will be defined. Multiple measures of assessment will be investigated and impacts in student learning will be explored.

EDUC 755. Exceptional Learners in the Secondary School Classroom. 3 Credits.

Legal and ethical requirements for educating exceptional learners; identification, referral, and placement procedures; development and use of the Individual Education Program; strategies for teaching and evaluating; managing academic and social behaviors of exceptional learners.

EDUC 775. Content Area Reading. 2 Credits.

Examination of content, instructional methodologies, and evaluation techniques for reading in content classes.

EDUC 778. School Fund Management. 3 Credits.

Proper recording and reporting of financial accounts for elementary and secondary schools. Use of procedures and concepts for governmental fund accounting and financial management. Prereq: M.S. Educational Administration.

EDUC 784. School Personnel Administration. 2 Credits.

Study of personnel administration in public school systems. Includes an examination of the purposes, policies, plans, procedures, and personnel administration. Prereq: EDUC 782.

EDUC 789. School Community Relations. 2 Credits.

Purposes, organization, agencies, and criteria of good school-community relationships; knowledge and techniques for effective public relations. Prereq: EDUC 739, M.S. in Educational Administration.

EDUC 790. Graduate Seminar. 1-5 Credits.**EDUC 791. Temporary/Trial Topics. 1-5 Credits.****EDUC 792. Graduate Teaching Experience. 1-6 Credits.**

Graduate student teaching experiences for professional development. S/U grading.

EDUC 793. Individual Study/Tutorial. 1-5 Credits.**EDUC 794. Practicum/Internship. 1-8 Credits.****EDUC 795. Field Experience. 1-15 Credits.****EDUC 796. Special Topics. 1-5 Credits.****EDUC 797S. Comprehensive Project. 1-6 Credits.****EDUC 797. Master's Paper. 1-3 Credits.****EDUC 798S. Specialist Field Study. 1-3 Credits.****EDUC 798. Master's Thesis. 1-10 Credits.****EDUC 801. Foundations of Doctoral Scholarship. 3 Credits.**

The expectations and responsibilities of doctoral scholars in the field of Education are examined. Expectations for knowledge acquisition, disciplined inquiry, and scholarly disposition are presented. Collegiality, collaboration, and ethical standards are emphasized. Prereq: Admission to Ed.D. program.

EDUC 802. Foundations of Educational Research. 3 Credits.

Examines various and diverse philosophical/theoretical frameworks, methodologies, techniques and designs for educational research. Explores the nature of educational research and the underpinnings of positivism/post-positivism, interpretive/constructivist and orientational paradigms with emphasis on reflective planning of studies. Prereq: admission to Doctoral program.

EDUC 803. Philosophical Foundations of Education. 3 Credits.

Through the examination of historical contexts and differing philosophical traditions within the field of education, students will reflect on and shape an informed and critical philosophy for their own scholarship and educational praxis. Admission to the Educational Doctoral Program is required.

EDUC 806. International and Comparative Education. 3 Credits.

The aim of this course is to add an international lens to our understanding of learning and education. Emphasizes globalization, comparative methods, policy, education as development, and analyzing teaching and learning within different national contexts.

EDUC 807. Diversity and Educational Policy. 3 Credits.

This course explores diversity in educational settings and investigates the purpose and implementation of educational policies related to access and services for diverse populations historically, presently, and in preparation for potential future needs.

EDUC 808. Empowerment & Transformative Education. 3 Credits.

An examination of theory, research and practice in individual and group transformation, empowerment, and advocacy development within multicultural and diverse learning contexts.

EDUC 811. Organizational Culture. 3 Credits.

This course examines organizational culture, including how culture is created, maintained, and changed through interaction. The course emphasizes deciphering organizational culture so that the decisions and actions taken by educational leaders will have greater impact on their organizations.

Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 812. Leadership in Educational Institutions. 3 Credits.

This course provides an in-depth overview of contemporary and classic theories of organizational leadership, with specific attention to the application of existing theories to educational institutions. This course addresses the implications of leadership across contexts, cultures, and time with an emphasis on understanding and appreciating the challenges faced by leaders in modern educational institutions. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 813. Educational Innovation and Change. 3 Credits.

This course introduces the field of organizational change, including providing an overview and analysis of the change process and the various strategies for planning and implementing change. The course will emphasize the nature, characteristics, responsibilities, and contextual determinants that influence a leader's role in changing educational organizations. Prereq: Admission to doctoral program in Education or consent of the instructor.

EDUC 831. Institutional Quality Control. 3 Credits.

History and effecting of quality control will be briefly reviewed. Global, U.S. societal, state government, accreditation, and student accountability forces will be elucidated. Successful, failed, and future institutional responses to these forces will be discussed. Prereq: Admission to doctoral program.

EDUC 832. Assessment Techniques for Educational Institutions. 3 Credits.

This course addresses all aspects of educational assessments in order to select the assessment technique that meets specific accountability mandates in the field of education. Prereq: Admission to doctoral program.

EDUC 833. Strategic Planning for Institutional Improvement. 3 Credits.

The role of strategic planning in educational institutions and its relationship to institutional improvement and effectiveness will be explored. Approaches to implementation of strategic plans designed to address institutional goals will also be discussed.

EDUC 844. Higher Education Law. 3 Credits.

To develop expertise in legal issues for students whose current positions or future career goals include administrative and management positions in higher education where they will work on legal issues with attorneys. Prereq: Admission to doctoral program.

EDUC 851. Adult Learning. 3 Credits.

Contextual influences and theoretical perspectives specific to adult learning. Theories of adult growth and development. Physical and cognitive changes throughout adulthood and other factors that have implications for the learning and teaching of adults.

EDUC 852. Foundations of Occupational & Adult Education. 3 Credits.

This course explores the nature, function, and scope of occupational and adult education. The course provides both knowledge of the history of occupational and adult education and an appreciation of historical and philosophical perspectives.

EDUC 853. Instructional Methods for Adult Learners. 3 Credits.

This course provides educators with ways to understand adult learning and to facilitate the teaching and learning transaction through an array of methods. Emphasis is on the relationship of current research to contemporary practice.

EDUC 863. Education and Training for Business and Industry. 3 Credits.

The purpose of this course is to teach the fundamentals necessary to educate and train people for the workforce according to evolving training needs of business, industry, military and government. Prereq: Admission to doctoral program.

EDUC 871. Planning and Conducting Needs Assessment. 3 Credits.

A three-phase model will be compared and contrasted to provide the skill and knowledge necessary for conducting needs assessments for educational schools and institutions. Prereq: Admission to doctoral program.

EDUC 872. Qualitative Research Methods. 3 Credits.

This course introduces foundational theories and approaches to qualitative research for education settings, including the identification and critique of various types of qualitative research, data collection techniques, approaches to coding, analysis, interpretation, and write-up. Prereq: Admission to doctoral program.

EDUC 873. Case-Based Educational Research and Statistics. 3 Credits.

The purpose of this course is to have graduate students understand statistical meanings and concepts which will provide the professional expertise needed to serve schools and institutions with their contemporary research and accountability needs. Prereq: Admission to doctoral program.

EDUC 881. Computer Data Management and Decision Making. 3 Credits.

Interpretation of effective computer applications for computer use as a decision-making and planning tool for school finance and managerial functions relating to the field of school business administration and school district superintendency. Prereq: EDUC 730, 10 credits in Educational Administration.

EDUC 882. Institutional Analysis Techniques. 3 Credits.

Surveys, focus groups, longitudinal studies, national data sets, correct statistical design and analyses, and effective reporting techniques will be reviewed and utilized in depth to address questions of institutional performance in academic and student affairs. Prereq: Admission to doctoral program.

EDUC 883. Survey Research. 3 Credits.

The study of theory, method, and techniques for conceptualizing and conducting survey research will be explored including survey design, administration, and data management.

EDUC 884. Program Evaluation Research. 3 Credits.

Major theoretical approaches to the evaluation of educational programs are reviewed, analyzed, and critiqued. Pragmatic implications for educational and social policy are addressed, as well as constructive impact on program decision-making. Prereq: Admission to doctoral program.

EDUC 885. Structural Equation Modeling Fundamentals. 3 Credits.

Conceptual and mathematical foundations of structural equation modeling techniques will be presented. Application to education research including model specification, testing, and interpretation using appropriate software will be emphasized. Prereq: EDUC 873.

EDUC 886. Advanced Qualitative Research. 3 Credits.

Examines diverse theoretical frameworks, methodologies, techniques and designs for qualitative research. Further expands requisite knowledge and analysis skills needed for the completion of research projects employing qualitative methods and research procedures. Admission to the Educational Doctoral Program is required.

EDUC 890. Graduate Seminar. 1-5 Credits.

EDUC 892. Graduate Teaching Experience. 1-6 Credits.

Graduate student teaching experiences for professional development. S/U grading.

EDUC 893. Individual Study/Tutorial. 1-5 Credits.

EDUC 894. Practicum/Internship. 1-8 Credits.

EDUC 896. Special Topics. 1-5 Credits.

EDUC 899. Doctoral Dissertation. 1-15 Credits.

Electrical & Computer Engineering (ECE)

ECE 111. Introduction to Electrical and Computer Engineering. 3 Credits.

Introduction to electrical and computer engineering problem solving, design and professional issues. 3 lectures. Prereq: MATH 105.

ECE 173. Introduction to Computing. 4 Credits.

Programming in a high level language with applications to engineering computation, analysis, and design. 3 lectures, 1 2-hour laboratory. Prereq: MATH 105.

ECE 193. Undergraduate Research. 1-5 Credits.

ECE 194. Individual Study. 1-5 Credits.

ECE 196. Field Experience. 1-15 Credits.

ECE 199. Special Topics. 1-5 Credits.

ECE 275. Digital Design. 4 Credits.

Introduction to computer arithmetic, designing combinatorial circuits, and designing basic sequential circuits. 3 lectures, 1 two-hour laboratory. Prereq: MATH 105.

ECE 291. Seminar. 1-3 Credits.

ECE 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 293. Undergraduate Research. 1-5 Credits.

ECE 294. Individual Study. 1-5 Credits.

ECE 299. Special Topics. 1-5 Credits.

ECE 301. Electrical Engineering I. 3 Credits.

Introduction to electrical engineering for non-majors. Fundamental laws of circuit analysis. Steady-state and transient analysis of DC and AC circuits. 3 lectures. Prereq: MATH 259 or MATH 265, PHYS 252.

ECE 303. Electrical Engineering II. 3 Credits.

Electronic circuits and their applications. Electromechanical energy conversion. Transformers, DC and AC machines. 3 lectures. Prereq: ECE 301.

ECE 306. Electrical Engineering Lab I. 1 Credit.

Electronic instruments and measurements. Applications to electrical and electronic circuits, power devices, and systems. 1 two-hour laboratory. Prereq: ECE 301.

ECE 311. Circuit Analysis II. 4 Credits.

Analysis of single-phase and three-phase circuits. Laplace transforms in circuit analysis. Fourier series. Two-port networks. 3 one-hour lectures, 1 two-hour laboratory. Prereq: EE 206 with a grade of C or better. Coreq: MATH 266.

ECE 320. Electronics I. 3 Credits.

Characterization, modeling, and analysis of digital circuits using diodes, BJTs, FETs, and Op Amps. 4 one-hour lectures, 1 two-hour laboratory each week for 10 weeks. Prereq: EE 206.

ECE 321. Electronics II. 2 Credits.

Characterization, modeling, and analysis of digital and analog circuits using diodes, BJTs, FETs, and Op Amps. 1 one-hour lecture, 1 two-hour laboratory each week for 6 weeks. Prereq: EE 206.

ECE 331. Energy Conversion. 4 Credits.

Magnetic circuits, transformers, DC and AC rotating machines. 3 one-hour lectures, 1 two-hour laboratory. Coreq: ECE 311.

ECE 341. Random Processes. 3 Credits.

Principles of probability. Application of probability and statistics to electrical and computer engineering problems. 3 lectures. Prereq: MATH 266.

ECE 343. Signals & Systems. 4 Credits.

Discrete-time and continuous-time signals and systems. Linearity, frequency response, difference and differential equations, transform techniques. Course covers a variety of essential mathematical concepts including complex arithmetic, difference and differential equations, convolution, Laplace transforms, z-transforms, and various Fourier representations. ECE 311.

ECE 351. Applied Electromagnetics. 4 Credits.

Lecture and laboratory introduction to electromagnetic waves in linear media, effects of boundaries, transmission lines, electrostatics, and magnetostatics. Introduction to time dependence and engineering applications. 4 lectures, 1 two-hour laboratory. Coreq: ECE 311.

ECE 373. Assembly Programming. 3 Credits.

Machine language, assembly language, and related hardware concepts, assembly language programming, macros and subroutines, system facilities and macros. Prereq: ECE 173, ECE 275 with a grade of C or better. Cross-listed with CSCI 373.

ECE 374. Computer Organization. 4 Credits.

Organization and structure of the major sections of a computer: CPU, memory, and I/O system organization and implementation issues. 3 lectures, 1 two-hour VHDL-based laboratory. Prereq: ECE 173, ECE 275 with a grade of C or better. Cross-listed with CSCI.

ECE 375. Digital Design 2. 3 Credits.

Sequential circuit design, design of optimized arithmetic circuits including adders, subtractors, multipliers and dividers, floating point arithmetic, and behavioral and structural VHDL. 2 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275.

ECE 376. Embedded Systems. 4 Credits.

Use of microcontrollers for data acquisition and device control. Includes assembly language and high-level programming, serial and parallel I/O, timers and interface design. 3 lectures, 1 two-hour laboratory. Prereq: ECE 173, ECE 275, EE 206.

ECE 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ECE 391. Seminar. 1-3 Credits.**ECE 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 393. Undergraduate Research. 1-5 Credits.**ECE 394. Individual Study. 1-3 Credits.****ECE 397. Fe/Coop Ed/Internship. 1-4 Credits.****ECE 399. Special Topics. 1-5 Credits.****ECE 401. Design I. 1 Credit.**

Capstone experience in formulation and design of a system or device. Basic project planning and software tools. 1 lecture. Coreq: ECE 320.

ECE 403. Design II. 2 Credits.

Capstone experience in formulation and design of a system or device. 2 two-hour design laboratories. Prereq: ECE 401, Senior standing.

ECE 405. Design III. 3 Credits.

Capstone experience in formulation and design of a system or device. 3 two-hours design laboratories. Prereq: ECE 403.

ECE 411. Optics for Scientists and Engineers. 3 Credits.

Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Prereq: PHYS 252. Co-req: ECE 411L. Cross-listed with PHYS 411. (Also offered for graduate credit - see ECE 611.).

ECE 411L. Optics for Scientists and Engineers Laboratory. 1 Credit.

Required laboratory for ECE/PHYS 411. Ten optics experiments plus a major-related optics project. Prereq: PHYS 252. Co-req: ECE 411. (Also offered for graduate credit - see 611L.).

ECE 413. Lasers for Scientists and Engineers. 3 Credits.

Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. Cross-listed with PHYS 413. (Also available for graduate credit - See ECE 613.).

ECE 415. Elements of Photonics. 3 Credits.

Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Prereq: PHYS 252. Cross-listed with PHYS 415. (Also offered for graduate credit - See ECE 615.).

ECE 417. Optical Signal Transmission. 3 Credits.

Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351. Cross-listed with PHYS 417. {Also offered for graduate credit - see ECE 617.}.

ECE 421. Communication Circuits. 3 Credits.

Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. Prereq: ECE 321. {Also offered for graduate credit - see ECE 621.}.

ECE 423. VLSI Design. 3 Credits.

Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. Prereq: ECE 320. {Also offered for graduate credit - see ECE 623.}.

ECE 424. Analog VLSI. 3 Credits.

Design, analysis, and simulation of analog VLSI circuits including operational amplifiers, current mode circuits, oscillators, translinear circuits, and phase locked-loops. Design automation for analog circuits. Prereq: ECE 311, ECE 321. {Also offered for graduate credit - see ECE 624.}.

ECE 425. Introduction to Semiconductor Devices. 3 Credits.

Properties and applications of semiconductors and solid-state electronic devices. Semiconductors, junctions, and transistors. 3 lectures. Prereq: ECE 320. {Also offered for graduate credit - see ECE 625.}.

ECE 426. Nanoelectronics. 3 Credits.

This course is designed to provide students with knowledge and understanding of physical background and applications of nanoelectronics, which reflects science and technology after the silicon-based microelectronics. The course will cover electrical and optical properties of materials and nanostructures, fabrication of nanostructures, nanoelectronic devices including resonant-tunneling devices, transistors, and single-electron transfer devices, as well as engineering applications of nanoscience and nanotechnology. Prereq: MATH 266, PHYS 252 and ECE 320.

ECE 427. Packaging for Electronics. 3 Credits.

Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. Cross-listed with IME 427. {Also offered for graduate credit - see ECE 627.}.

ECE 429. Introduction to IC Fabrication. 3 Credits.

This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with IME 429. {Also offered for graduate credit - see ECE 629.}.

ECE 431. Power Systems. 3 Credits.

Electrical characteristics of high voltage lines. Symmetrical components, per unit system, and transformers. Matrix methods, load flow, and fault analysis. 3 lectures. Prereq: ECE 311. {Also offered for graduate credit - see ECE 631.}.

ECE 432. Computational Methods in Power Systems. 3 Credits.

Power flow, optimal power flow, state estimation, contingency analysis, unit commitment, security assessment, small signal and dynamic stability, voltage stability, emerging algorithms for blackout and vulnerability assessment in power systems. Co-req: ECE 431. {Also offered for graduate credit - see ECE 632.}.

ECE 433. Power Systems Design. 3 Credits.

Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. Prereq: ECE 311. {Also offered for graduate credit - see ECE 633.}.

ECE 437. Power Electronics. 3 Credits.

Characteristics and modeling of power electronic devices. Rectifiers, choppers, and inverters and their applications in power supplies and motor drives. 3 lectures. Prereq: ECE 321. {Also offered for graduate credit - see ECE 637.}.

ECE 438. Electric Drives. 4 Credits.

Characteristics of loads and drive train, power converters, four quadrant ac/dc drives, DSP control, drives for special motors, applications including electric vehicles. 3 lectures, 1 two-hour laboratory. Prereq: ECE 331 with a grade of C or better, ECE 437 with a grade of C or better. {Also offered for graduate credit - see ECE 638.}.

ECE 443. Communications I. 4 Credits.

Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures, 1 two-hour laboratory. Prereq: ECE 341 and ECE 343. {Also offered for graduate credit - see ECE 643.}.

ECE 444. Applied Digital Signal Processing. 3 Credits.

Digital signal processing theory balanced with practical application. Includes design of FIR, IIR, and adaptive filters; Fast Fourier Transforms; sampling theory; implementation techniques; multi-rate processing. Emphasizes system implementation using development tools and DSP hardware. 3 lectures. Prereq: ECE 173, ECE 343. {Also offered for graduate credit - see ECE 644.}.

ECE 445. Communications II. 3 Credits.

Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 2 lectures. Prereq: ECE 443. {Also offered for graduate credit - see ECE 645.}.

ECE 448. Image Analysis I. 3 Credits.

Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. Prereq: EC 343 or instructor approval. {Also offered for graduate credit - see ECE 648.}.

ECE 451. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.

This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. Prereq: ECE 321 and ECE 351. {Also offered for graduate credit - see ECE 651.}.

ECE 453. Signal Integrity. 3 Credits.

Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. Prereq: ECE 311, ECE 351. {Also offered for graduate credit - see ECE 653.}.

ECE 455. Designing for Electromagnetic Compatibility. 3 Credits.

Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. Prereq: ECE 343, ECE 351. {Also offered for graduate credit - see ECE 655.}.

ECE 461. Control Systems I. 4 Credits.

Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. Prereq: ECE 343. {Also offered for graduate credit - see ECE 661.}.

ECE 463. Modern Control. 3 Credits.

Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization, and state-estimation. 3 lectures. Prereq: ECE 343. {Also offered for graduate credit - see ECE 663.}.

ECE 470. Fault Tolerant Digital Systems. 3 Credits.

Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. Prereq: ECE 275. {Also offered for graduate credit - see ECE 670.}.

ECE 471. Computer Systems Design and Implementation. 3 Credits.

Design and implementation of reliable, interrupt driven systems. Use of development tools. System components issues including co-processors, buses, run-time. Prereq: ECE 376, ECE 401, CSCI 474.

ECE 472. Design Automation of VLSI Circuits. 3 Credits.

Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. Prereq: ECE 173, 275 with a grade of C or better. {Also offered for graduate credit - see ECE 672.}.

ECE 474. Computer Architecture. 3 Credits.

Topics pertaining to computer architecture will include: pipelining, caches, memory, I/O superscalar and out-of-order instruction execution, speculative execution, vector execution, multithreading, and multiprocessors. Prereq: ECE 374. {Also offered for graduate credit - see ECE 674.}.

ECE 476. Advanced Embedded Systems. 4 Credits.

Specification, design, development, and test of modern embedded systems using a high-level programming language. 3 lectures, 1 two-hour laboratory. Prereq: ECE 376. {Also available for graduate credit, See ECE 676.}.

ECE 477. Hardware Design for Machine Learning. 3 Credits.

Hardware-aware neural network (NN) design in NVidia Developer kit with OpenCV python programming. MAC design for NN and alternate neural network implementations using emerging technologies. Advanced topics in Hardware-aware neural network designs such as Binary nets, FFT-based neural nets, In-compute Memory and near-compute memory. 2 lectures, 1 two-hour laboratory. Prereq: ECE 374 and ECE 375. {Also offered for graduate credit - See ECE 677.}.

ECE 483. Instrumentation for Engineers. 3 Credits.

Study of instrumentation including design, fabrication, and application. Prereq: Senior standing. {Also offered for graduate credit - see ECE 683.}.

ECE 485. Biomedical Engineering. 3 Credits.

Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. Prereq: Senior standing. {Also offered for graduate credit - see ECE 685.}.

ECE 486. Biosensing Technology. 3 Credits.

Biosensors are defined as analytical devices incorporating a biological material, a biologically derived material or a biomimic associated with or integrated within a physicochemical transducer or transducing microsystem, which may be optical, electrochemical, thermometric, piezoelectric, magnetic or micromechanical. This course provides instruction in the basic science and engineering concepts required to understand the design and application of biosensors. This module serves as an introduction to some of the biosensors and measurement techniques. Prereq: Senior standing. {Also available for graduate credit - see ECE 686.}.

ECE 487. Cardiovascular Engineering. 3 Credits.

This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. Prereq: Senior standing. {Also offered for graduate credit - see ECE 687.}.

ECE 488. Cardiovascular Engineering II. 3 Credits.

Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 487. {Also offered for graduate credit - see ECE 688.}.

ECE 491. Seminar. 1-5 Credits.**ECE 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ECE 493. Undergraduate Research. 1-5 Credits.**ECE 494. Individual Study. 1-5 Credits.****ECE 496. Field Experience. 1-15 Credits.****ECE 499. Special Topics. 1-5 Credits.****ECE 611. Optics for Scientists and Engineers. 3 Credits.**

Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with PHYS 611. {Also offered for undergraduate credit - see ECE 411.}.

ECE 611L. Optics for Scientists and Engineers Laboratory. 1 Credit.

Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with PHYS 611L. {Also offered for undergraduate credit - see ECE 411L.}.

ECE 613. Lasers for Scientists and Engineers. 3 Credits.

Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with PHYS 613. {Also available for undergraduate credit - See ECE 413.}.

ECE 615. Elements of Photonics. 3 Credits.

Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with PHYS 615. {Also offered for undergraduate credit - See ECE 415.}.

ECE 617. Optical Signal Transmission. 3 Credits.

Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Cross-listed with PHYS 617. {Also offered for undergraduate credit - see ECE 417.}.

ECE 621. Communications Circuits. 3 Credits.

Resonant circuits and tuned amplifiers, oscillators, modulators and demodulators, phase-locked loops, and power amplifiers. Analysis, design, and applications in communication systems. 3 lectures. S {Also offered for undergraduate credit - see ECE 421.}.

ECE 623. VLSI Design. 3 Credits.

Analysis and design of digital integrated circuits. Characteristics and applications of logic gates and regenerative logic circuits. 3 lectures. {Also offered for undergraduate credit - see ECE 423.}.

ECE 624. Analog VLSI. 3 Credits.

Design, analysis, and simulation of analog VLSI circuits including operational amplifiers, current mode circuits, oscillators, translinear circuits, and phase locked-loops. Design automation for analog circuits. {Also offered for undergraduate credit - see ECE 424.}.

ECE 625. Introduction to Semiconductor Devices. 3 Credits.

Properties and applications of semiconductors and solid-state electronic devices. Semiconductors, junctions, and transistors. 3 lectures. F/2 {Also offered for undergraduate credit - see ECE 425.}.

ECE 627. Packaging for Electronics. 3 Credits.

Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Cross-listed with IME 627. {Also offered for undergraduate credit - see ECE 427.}.

ECE 629. Introduction to IC Fabrication. 3 Credits.

This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with IME 629. {Also offered for undergraduate credit - see ECE 429.}.

ECE 631. Power Systems. 3 Credits.

Electrical characteristics of high voltage lines. Symmetrical components, per unit system, and transformers. Matrix methods, load flow, and fault analysis. 3 lectures. F {Also offered for undergraduate credit - see ECE 431.}.

ECE 632. Computational Methods in Power Systems. 3 Credits.

Power flow, optimal power flow, state estimation, contingency analysis, unit commitment, security assessment, small signal and dynamic stability, voltage stability, emerging algorithms for blackout and vulnerability assessment in power systems. {Also offered for undergraduate credit - see ECE 432.}.

ECE 633. Power Systems Design. 3 Credits.

Unbalanced power systems, economic dispatch, transients in power systems, power system stability, power system protection. 3 lectures. S {Also offered for undergraduate credit - see ECE 433.}.

ECE 637. Power Electronics. 3 Credits.

Characteristics and modeling of power electronic devices. Rectifiers, choppers, and inverters and their applications in power supplies and motor drives. 3 lectures. F {Also offered for undergraduate credit - see ECE 437.}.

ECE 638. Electric Drives. 4 Credits.

Characteristics of loads and drive train, power converters, four quadrant ac/dc drives, DSP control, drives for special motors, applications including electric vehicles. 3 lectures, 1 two-hour laboratory. Prereq: ECE 637. S {Also offered for undergraduate credit - see ECE 438.}.

ECE 643. Communications I. 4 Credits.

Communications theory and design with an emphasis on spectral techniques. Modulation and noise effects. 3 lectures, 1 two-hour laboratory. F, S {Also offered for undergraduate credit - see ECE 443.}.

ECE 644. Applied Digital Signal Processing. 3 Credits.

Digital signal processing theory balanced with practical application. Includes design of FIR, IIR, and adaptive filters; Fast Fourier Transforms; sampling theory; implementation techniques; multi-rate processing. Emphasizes system implementation using development tools and DSP hardware. 3 lectures. F {Also offered for undergraduate credit - see ECE 444.}.

ECE 645. Communications II. 3 Credits.

Continuation of ECE 443. Digital communications systems. Optimum receivers. Information theory and coding. 2 lectures. S/2 {Also offered for undergraduate credit - see ECE 445.}.

ECE 648. Image Analysis I. 3 Credits.

Image acquisition, resolution, enhancement, restoration, and equalization. Illuminations, reflectance, and noise considerations. Segmentation, shape characterization, and object recognition. Simulation examples, computer problems, and gathering of actual scientific images via camera and computer. {Also offered for undergraduate credit - see ECE 448.}.

ECE 651. RF and Microwave Circuit Analysis and Design for Wireless Systems. 3 Credits.

This course will focus on the analysis and design of Radio Frequency (RF) and microwave circuits. In particular, circuits such as oscillators, filters, power dividers, amplifiers, mixers and modulators will be studied for wireless systems. {Also offered for undergraduate credit - see ECE 451.}.

ECE 653. Signal Integrity. 3 Credits.

Topics in system level signal integrity are presented. The construction and design of passive printed circuit cards are discussed, with computer aided design software used for analysis and class presentations. Circuit card fabrication issues and case examples of applications are discussed. F/2 {Also offered for undergraduate credit - see ECE 453.}.

ECE 655. Designing for Electromagnetic Compatibility. 3 Credits.

Principles and methods concerning electronic system designs that are not sources of or susceptible to electromagnetic interference. 3 lectures. Laboratory. F/2 {Also offered for undergraduate credit - see ECE 455.}.

ECE 661. Control Systems I. 4 Credits.

Modeling and control of dynamic systems, including root-locus, Bode plots, and Nichols charts. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 461.}.

ECE 663. Modern Control. 3 Credits.

Analysis and design of controllers for linear and non-linear systems using state-space methods. Design to specifications, controllability, observability, stability, optimization and state-estimation. 3 lectures. {Also offered for undergraduate credit - see ECE 463.}.

ECE 670. Fault Tolerant Digital Design. 3 Credits.

Design and analysis of reliable digital systems through robust information coding, fault avoidance, and fault-tolerance. 3 lectures. {Also offered for undergraduate credit - see ECE 470.}.

ECE 672. Design Automation of VLSI Circuits. 3 Credits.

Electronic design automation algorithms utilized by software tools, which are used for the design automation of VLSI integrated circuits. This course will cover design steps including circuit synthesis, technology mapping, formal verification, floorplanning, placement, and routing. {Also offered for undergraduate credit - see ECE 472.}.

ECE 674. Computer Architecture. 3 Credits.

Processor operations, computer arithmetic, control mechanism, instruction sets, classification schemes, pipelining, parallel processing, hierarchical memory and memory management, I/O methods and interrupts, and interconnection buses. 3 lectures. {Also offered for undergraduate credit - see ECE 474.}.

ECE 675. Advanced Digital Design. 4 Credits.

Master advanced logic design concepts, including the design and testing of synchronous and asynchronous combinational and sequential circuits using state of the art CAD tools. 3 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - see ECE 475.}.

ECE 676. Advanced Embedded Systems. 4 Credits.

Specification, design, development, and test of modern embedded systems using a high-level programming language. 3 lectures, 1 two-hour laboratory. {Also available for undergraduate credit, See ECE 476.}.

ECE 677. Hardware Design for Machine Learning. 3 Credits.

Hardware-aware neural network (NN) design in NVidia Developer kit with OpenCV python programming. MAC design for NN and alternate neural network implementations using emerging technologies. Advanced topics in Hardware-aware neural network designs such as Binary nets, FFT-based neural nets, In-compute Memory and near-compute memory. 2 lectures, 1 two-hour laboratory. {Also offered for undergraduate credit - See ECE 477.}.

ECE 683. Instrumentation for Engineers. 3 Credits.

Study of instrumentation including design, fabrication, and application. F {Also offered for undergraduate credit - see ECE 483.}.

ECE 685. Biomedical Engineering. 3 Credits.

Unified study of engineering techniques and basic principles in physiological systems. Focus on membrane biophysics, biological modeling, compartmental analysis, and systems control theory. F {Also offered for undergraduate credit - see ECE 485.}.

ECE 686. Biosensing Technology. 3 Credits.

Biosensors are defined as analytical devices incorporating a biological material, a biologically derived material or a biomimic associated with or integrated within a physicochemical transducer or transducing microsystem, which may be optical, electrochemical, thermometric, piezoelectric, magnetic or micromechanical. This course provides instruction in the basic science and engineering concepts required to understand the design and application of biosensors. This module serves as an introduction to some of the biosensors and measurement techniques. Prereq: Graduate standing. {Also available for undergraduate credit - see ECE 486.}.

ECE 687. Cardiovascular Engineering. 3 Credits.

This course includes the application of engineering techniques to cardiovascular physiology and medicine. Basic cardiac and vascular physiology will be presented, modeling techniques will be examined. Instrumentation, measurement theory, and assist devices will be discussed. S {Also offered for undergraduate credit - see ECE 487.}.

ECE 688. Cardiovascular Engineering II. 3 Credits.

Analysis, design, and research methods related to modeling and simulating the cardiovascular system. Prereq: ECE 687. {Also offered for undergraduate credit - see ECE 488.}.

ECE 690. Graduate Seminar. 1-3 Credits.**ECE 695. Field Experience. 1-15 Credits.****ECE 696. Special Topics. 1-5 Credits.****ECE 701. Advanced Engineering Problem Solving. 3 Credits.**

Application of advanced mathematical and computational methods to engineering problems. 3 lectures. S.

ECE 702. Advanced Research Topics. 1 Credit.

Prepare the student in finding a major adviser; defining the research questions or objectives; beginning a literature search; learning how to prepare a manuscript and/or grant application with their major adviser. F.

ECE 703. Advanced Teaching and Classroom Topics. 1 Credit.

To help prepare the Ph.D. student for the challenge of teaching in a classroom. F.

ECE 705. Stochastic Processes. 3 Credits.

Random variables, probability bounds, random vectors, random sequences, stochastic processes, and statistical signal processing.

ECE 713. Introduction to Lab-on-a-Chip Technology. 3 Credits.

This course introduces the fundamentals of Lab-on-a-chip technology. It also provides a comprehensive picture of instruments, tools and techniques used in various aspects of Lab-on-a-chip technology. Finally, some applications in biomedical engineering will be discussed.

ECE 721. Integrated Circuits. 3 Credits.

Introduction to CMOS circuits. Circuit characterization and performance estimation. CMOS circuit and logic design, CMOS testing. CMOS subsystem design. 3 lectures. Prereq: ECE 623.

ECE 722. Wireless IC Design. 3 Credits.

Basic concepts of wireless IC design. Various radio transceiver architectures and its application. Design of CMOS radio transceiver circuit blocks. Hands-on-experience on IC design and layout using industry-based chip design software Cadence. Prereq: ECE 621.

ECE 723. Advanced Electronics. 3 Credits.

Characteristics and detailed modeling of operational amplifiers. Applications to waveform generation, analog multiplication, modulation, and data conversion. IC and special amplifiers. 3 lectures. Prereq: ECE 621. (alternate years).

ECE 726. Advanced VLSI Design. 3 Credits.

This course covers state-of-the-art design techniques for VLSI at device, circuit, architecture, and application levels. Prereq: ECE 423 or ECE 623.

ECE 731. Power System Protection. 3 Credits.

Power system protective relaying. Generator, transformer, line, bus, motor protection. 3 lectures. Coreq: ECE 633. S.

ECE 733. Power Distribution. 3 Credits.

Power distribution systems. Lines and transformers, characteristics of loads, voltage drops and corrective measures, lightning protection. Fault analysis, fuses, reclosers, sectionalizers. Power system harmonics and power quality. 3 lectures. Coreq: ECE 631. F.

ECE 734. Modeling and Control of High Voltage Direct Current (HVDC) Systems. 3 Credits.

The course covers fundamentals of modeling, analysis and control of LCC and VSC HVDC systems. Applications integrating renewable energy will also be studied. Prereq: ECE 631.

ECE 737. Advanced Power Electronics. 3 Credits.

The course teaches the characteristics and detailed design of power semiconductors, power conversion topologies and controls, passive component design and selection, and advanced control strategies for DC-DC converters and DC-AC Inverters. 3 lectures Prereq: ECE 637.

ECE 741. Signal Processing I. 3 Credits.

Analysis and design of discrete- and continuous time signals and systems. Advanced treatment of transform techniques and Fourier analysis. Classical filter design techniques. Fast Fourier transform algorithms and applications. 3 lectures. Prereq: ECE 643.

ECE 743. Signal Processing II. 3 Credits.

Discrete-time Wiener and Kalman filtering. Least squares signal processing and filter design. Spectral analysis. Adaptive signal processing. 3 lectures. Prereq: ECE 741. S.

ECE 745. Statistical Communications. 3 Credits.

Advanced topics in communications theory including detection theory, estimation theory, and information theory. 3 lectures. Prereq: ECE 643. S.

ECE 748. Elements of Information Theory. 3 Credits.

This course will cover: entropy, asymptotic equipartition property, data compression, channel capacity, differential entropy, the Gaussian channel, an introduction to rate distortion theory and network information theory.

ECE 749. Wireless Communication. 3 Credits.

Wireless channel model, design of transmission and reception techniques for wireless communication systems and their performance analysis.

ECE 751. Electromagnetic Theory and Applications. 3 Credits.

Theory of radiation, antenna characteristics, complex waves, potential functions and spectral domain methods for wave guides and cavities, and dispersive media. 3 lectures. S/2.

ECE 755. Advanced Topics in Electromagnetics. 3 Credits.

Topics of current interest in electromagnetics, microwaves, and optics. 3 lectures. Prereq: ECE 751. S/2.

ECE 761. Advanced Control Theory I. 3 Credits.

State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control.

ECE 763. Advanced Control Theory II. 3 Credits.

State variable formulation of the control problem; system identification. Introduction to adaptive, distributed, multivariable, nonlinear, optimal, and stochastic control. Prereq: ECE 761.

ECE 772. Low Power Circuit and System Design. 3 Credits.

This course will cover state-of-the-art design techniques for low power digital circuits and systems at device, circuit, architecture, system, and application levels.

ECE 775. Hardware For Cryptography. 3 Credits.

This course covers the mathematical background, modern cryptographic techniques like block ciphers, hash functions and public-key cryptosystems. Hardware and embedded implementations of cryptosystems and recent research in hardware implementation are also covered. Prereq: CSCI 669.

ECE 776. Software and Hardware for Cloud Computing. 3 Credits.

The course will focus on the architectural components of cloud computing systems with particular emphasis on service delivery models and management of cloud environment and services. Prereq: ECE 774.

ECE 777. System Level Design and Automation. 3 Credits.

Background, useful abstractions and needed techniques for system-level modeling, performance analysis, synthesis and optimization. Emphasis is on both computation and communication aspects involved in the Systems-On-Chip design of embedded applications.

ECE 778. Computer Networks. 3 Credits.

Examination of computer networks using the ISO-OSI model as a framework. Exploration of practical and theoretical issues in modems, codes, error, impairments, modulation, protocols, and interfaces. 3 lectures. (alternate years).

ECE 779. Computer-Aided Verification. 3 Credits.

Formal verification methods for hardware systems, such as theorem proving, property-based verification, equivalence checking, notions of correctness such as refinement, methods used in computer-aided verification including BDDs and SAT procedures.

ECE 787. Advanced Cardiovascular Engineering III. 3 Credits.

Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a grant proposal. Prereq: ECE 687 and ECE 688.

ECE 788. Advanced Cardiovascular Engineering IV. 3 Credits.

Advanced research topics in multi-scale cardiac modeling such as ventriculo-arterial coupling, organ-level characterization, tissue characterization, cellular properties, and sub-cellular processes culminating in a research journal manuscript or conference proceeding. Prereq: ECE 787.

ECE 790. Graduate Seminar. 1-3 Credits.**ECE 791. Temporary/Trial Topics. 1-5 Credits.****ECE 793. Individual Study/Tutorial. 1-5 Credits.****ECE 795. Field Experience. 1-15 Credits.****ECE 796. Special Topics. 1-5 Credits.****ECE 797. Master's Paper. 1-3 Credits.****ECE 798. Master's Thesis. 1-10 Credits.****ECE 801. Big Data and Cloud Computing. 3 Credits.**

The course will focus on the state-of-the-art cloud infrastructure with primary emphasis on manipulating, storing, and analyzing big data. Prereq: ECE 776.

ECE 802. High Performance Computing in the Cloud. 3 Credits.

The course will focus on a compelling vision of seamless scaling of computational resources in the cloud computing paradigm to achieve high performance. Prereq: ECE 776.

ECE 892. Graduate Teaching Experience. 1-6 Credits.**ECE 893. Individual Study. 1-5 Credits.****ECE 899. Doctoral Dissertation. 1-15 Credits.**

Electrical Engineering (EE)

EE 206. Circuit Analysis I. 4 Credits.

Linear electric circuits. Component models, circuit laws, transient analysis, design issues, computer tools. 3 lectures, 1 two-hour recitation/laboratory. Prereq: MATH 166 with a grade of C or better. Co-req: MATH 129.

Emergency Management (EMGT)

EMGT 101. Emergencies, Disasters, and Catastrophes. 3 Credits.

An overview of emergencies, disasters, and catastrophes from a social, political, historical, policy, environmental, international and cross-cultural perspective. Focuses on differences in these events in terms of scale as well as cause from the disaster phase approach.

EMGT 150. Dealing with Terrorism, Cybersecurity and Other Emerging Threats. 3 Credits.

Examines the historical emergence of security threats and how American society has addressed them. Topics include key homeland security concerns and approaches, events, policies, and organizational structures including relationships to emergency management.

EMGT 199. Special Topics. 1-5 Credits.**EMGT 222. Career and Professional Development. 3 Credits.**

This course focuses on the elements of career and professional development important to personal and professional success. This includes: understanding strengths, interests, and career interests; soft skills important to success in the workplace and career field; examining career pathways; acquiring resume, interview, and job search ability; the role of professional development across the career pathway; and the importance of mentoring, leadership, and being a change agent.

EMGT 281. Disaster Analysis. 3 Credits.

Examination of natural and human-made disasters from a multidisciplinary perspective.

EMGT 291. Seminar. 1-5 Credits.

EMGT 294. Individual Study. 1-5 Credits.

EMGT 299. Special Topics. 1-5 Credits.

EMGT 361. Disaster Preparedness. 3 Credits.

Nature and rationale for public awareness of potential hazards that communities face, preparedness for these hazards, and potential strategies to mitigate adverse consequences. Prereq: EMGT 101.

EMGT 362. Disaster Mitigation. 3 Credits.

Role of emergency management programs in community resilience and sustainability; incorporation of preparedness, mitigation, response, and recovery in community comprehensive and strategic planning. Prereq: EMGT 101.

EMGT 363. Disaster Response. 3 Credits.

Principles and procedures related to emergency operations plans, warning, evacuation, search and rescue, mass casualty care, sheltering, donations, management, disaster declaration, and incident debriefing. Prereq: EMGT 101.

EMGT 364. Disaster Recovery. 3 Credits.

Examination of post-disaster policies and programs that protect the natural environment, improve disaster resistance, support diverse populations, improve economic conditions, and preserve community resources. Prereq: EMGT 101.

EMGT 379. Study Tour Abroad. 1-6 Credits.

EMGT 391. Seminar. 1-5 Credits.

EMGT 410. Comprehensive Emergency Management Planning. 3 Credits.

Educates students in the preparation of various types of emergency management plans and how to lead an effective planning process within non-profits, businesses, and/or government organizations. Prereq: EMGT 101 and any one of the following: EMGT 261, EMGT 262, EMGT 263 or EMGT 264. {Also offered for graduate credit - see EMGT 610.}.

EMGT 414. Spatial Analysis in Emergency Management. 3 Credits.

This course is designed to provide emergency management students with specific disaster related applications of spatial analysis techniques in state of the art GIS software. Prereq: EMGT 101 and any one of the following: EMGT 261, EMGT 262, EMGT 263 or EMGT 264. {Also offered for graduate credit - see EMGT 614.}.

EMGT 420. Hazard, Risk, and Vulnerability Assessments. 3 Credits.

Educates students in the preparation of hazard, risk, and vulnerability assessments. Prereq: EMGT 414. {Also offered for graduate credit - see EMGT 620.}.

EMGT 425. World Disasters. 3 Credits.

Explores hazard events, emergency management processes and structures, and how they vary around the world.

EMGT 430. Emergency Management Capstone. 3 Credits.

Synthesis of emergency management coursework for evaluation of personal performance related to undergraduate learning objectives and assessment of areas for professional development into the future.

EMGT 435. Issues in Homeland Security and Emergency Management. 3 Credits.

An analysis of homeland security and its relationship to emergency management within the framework of evolving domestic and international hazards.

EMGT 445. Understanding Vulnerable Populations in Disasters. 3 Credits.

Using the framework of vulnerability theory this course examines research related to groups that have been historically labeled "special populations" and how their functional needs might be addressed through emergency management. The purpose of this course is to familiarize students with the concept of vulnerable populations and its relationship to disasters, the ways members of various populations can be impacted disproportionately by these events and needs that arise as a result, and what can or should be doing to help prepare for and respond to these needs.

EMGT 461. Business Continuity and Crisis Management. 3 Credits.

This course provides an overview of planning and management principles applicable to business or operational resumption following an emergency. The emphasis will be on minimizing the impact of a disaster on business operations. {Also offered for graduate credit - see EMGT 661.}.

EMGT 463. Voluntary Agency Disaster Services. 3 Credits.

Examination of the roles played by local, state, national, and international voluntary agencies in emergency preparedness, mitigation, response, and recovery. Prereq: EMGT 101. {Also offered for graduate credit - see EMGT 663.}.

EMGT 491. Seminar. 1-5 Credits.

EMGT 494. Individual Study. 1-5 Credits.

EMGT 496. Field Experience. 1-15 Credits.

EMGT 499. Special Topics. 1-5 Credits.

EMGT 610. Comprehensive Emergency Management Planning. 3 Credits.

Educates students in the preparation of various types of emergency management plans and how to lead an effective planning process within non-profits, businesses, and/or government organizations. {Also offered for undergraduate credit - see EMGT 410.}.

EMGT 614. Spatial Analysis in Emergency Management. 3 Credits.

This course is designed to provide emergency management students with specific disaster related applications of spatial analysis techniques in state of the art GIS software. {Also offered for undergraduate credit - see EMGT 414.}.

EMGT 620. Hazard, Risk, and Vulnerability Assessments. 3 Credits.

Educates students in the preparation of hazard, risk, and vulnerability assessments. Prereq: EMGT 614. {Also offered for undergraduate credit - see EMGT 420.}.

EMGT 635. Issues in Homeland Security and Emergency Management. 3 Credits.

An analysis of homeland security and its relationship to emergency management within the framework of evolving domestic and international hazards.

EMGT 661. Business Continuity & Crisis Management. 3 Credits.

This course provides an overview of planning and management principles applicable to business or operational resumption following an emergency. The emphasis will be on minimizing the impact of a disaster on business operations. {Also offered for undergraduate credit - see EMGT 461.}.

EMGT 663. Voluntary Agency Disaster Services. 3 Credits.

Examination of the roles played by local, state, national, and international voluntary agencies in emergency preparedness, mitigation, response, and recovery. {Also offered for undergraduate credit - see EMGT 463.}.

EMGT 681. Disaster Analysis. 3 Credits.

Examination of natural and human-made disasters from a multidisciplinary perspective. {Also offered for undergraduate credit - see EMGT 481.}.

EMGT 690. Graduate Seminar. 1-5 Credits.

EMGT 695. Field Experience. 1-15 Credits.

EMGT 696. Special Topics. 1-5 Credits.

EMGT 720. Theory, Research and Practice. 3 Credits.

An integrative review of theories and concepts in emergency management and their link to research conceptualization, design as well as field application and practice.

EMGT 730. Advanced Research Methods. 3 Credits.

This course reviews qualitative and quantitative methodologies and provides additional depth on their application to emergency management research projects. Prereq: SOC 700, SOC 701.

EMGT 761. Preparedness Theory and Practice. 3 Credits.

Examination of natural and human-made disasters from a risk assessment perspective, and preparedness and control procedures for each of these types of disaster.

EMGT 762. Mitigation Theory and Practice. 3 Credits.

Examination of disaster mitigation theory and the rationale and context of mitigation procedures, programs, and planning. Students will acquire both theoretical and applied understandings of mitigation principles and practices. Prereq: EMGT 613.

EMGT 763. Response Theory and Practice. 3 Credits.

Examination of the theory and practice of response including response variance and effectiveness.

EMGT 764. Recovery Theory and Practice. 3 Credits.

Theory, principles, and procedures used in disaster damage assessment and in emergency supply and service dissemination.

EMGT 790. Graduate Seminar. 1-5 Credits.

EMGT 793. Individual Study. 1-5 Credits.

EMGT 794. Practicum/Internship. 1-8 Credits.

EMGT 795. Field Experience. 1-15 Credits.

EMGT 797. Master's Paper. 1-5 Credits.

EMGT 798. Master's Thesis. 1-10 Credits.

EMGT 861. Preparedness Theory II. 3 Credits.

Doctoral students develop specialization in preparedness theory by selecting one or more topical areas within preparedness about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 761.

EMGT 862. Mitigation Theory II. 3 Credits.

Doctoral students develop specialization in mitigation theory by selecting one or more topical areas within mitigation about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 762.

EMGT 863. Response Theory II. 3 Credits.

Doctoral students develop specialization in response theory by selecting one or more topical areas within response about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 763.

EMGT 864. Recovery Theory II. 3 Credits.

Doctoral students develop specialization in recovery theory by selecting one or more topical areas within recovery about which they will broaden and deepen their knowledge with faculty mentorship. Prereq: EMGT 764.

EMGT 893. Individual Study/Tutorial. 1-5 Credits.**EMGT 894. Practicum/Internship. 1-8 Credits.****EMGT 895. Field Experience. 1-15 Credits.****EMGT 899. Doctoral Dissertation. 1-15 Credits.**

Engineering General (ENGR)

ENGR 111. Introduction to Engineering. 1 Credit.

Designed to provide general engineering students with an opportunity to review, study, discuss, and evaluate various engineering professions as career choices. F, S.

ENGR 191. Seminar. 1-5 Credits.**ENGR 194. Individual Study. 1-3 Credits.****ENGR 196. Field Experience. 1-15 Credits.****ENGR 199. Special Topics. 1-5 Credits.****ENGR 291. Seminar. 1-3 Credits.****ENGR 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 294. Individual Study. 1-5 Credits.**ENGR 299. Special Topics. 1-5 Credits.****ENGR 310. Entrepreneurship for Engineers and Scientists. 3 Credits.**

How to turn a great idea into a business by starting a company and/or profiting from a new invention. Developing a product, conducting patent searches, securing intellectual property rights, writing a business plan, obtaining financing, etc. are covered. F.

ENGR 311. History of Technology in America. 3 Credits.

Development of tools, technology, and whole systems, especially the U.S. experience since 1700. Contributions of Jefferson, Richards, Edison and others as models of creativity as a foundation for the emergence of modern conceptions of progress.

ENGR 312. Impact of Technology on Society. 3 Credits.

Study of the impact of technology on the natural environment; discussion of values, ethics, citizenship, social responsibilities, and the relationship of humans to the environment.

ENGR 321. Introduction to Robotics. 3 Credits.

This course equips students with basic principles of Robotics. Students learn the basic engineering elements that are involved in building robots, and applications of robots in the engineering practice. Prereq: PHYS 252, PHYS 252L.

ENGR 327. Ethics, Engineering, and Technology. 3 Credits.

Students will learn a unique and systematic approach to deal with the ethical issues that are increasingly inherent in technology and engineering practice. Using human morality, this course will examine the emergence of advanced technological systems and how they affect our individual and social behaviors, and in return, how they are affected by those behaviors and our shared and individual morality. Students will examine a broad range of ethical topics in design, sustainability and emerging technologies, professional codes of ethics and case studies. Cross-listed with PHIL.

ENGR 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENGR 391. Seminar. 1-3 Credits.**ENGR 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 394. Individual Study. 1-3 Credits.**ENGR 399. Special Topics. 1-5 Credits.****ENGR 402. Engineering Ethics and Social Responsibility. 1 Credit.**

Philosophical basis for ethical decisions, guidance for ethical decision making in engineering practice, ethics of social responsibility, professionalism, case studies, and codes of conduct for engineers. Prereq: junior or senior standing.

ENGR 481. Engineering Entrepreneurship Capstone I. 3 Credits.

Integration of engineering and entrepreneurship topics in capstone projects. Students will develop a new business starting from the identification of needs all the way through to the initial minimum viable product build. Prereq: ENGR 310, senior standing, and major departmental approval.

ENGR 482. Engineering Entrepreneurship Capstone II. 3 Credits.

Integration of engineering and entrepreneurship topics in capstone projects. Students will develop a new business starting from the identification of needs all the way through to the initial minimum viable product build. Prereq: ENGR 310, senior standing, and major departmental approval.

ENGR 491. Seminar. 1-5 Credits.**ENGR 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGR 493. Undergraduate Research. 1-5 Credits.**ENGR 494. Individual Study. 1 Credit.****ENGR 496. Field Experience. 1-15 Credits.****ENGR 499. Special Topics. 1-5 Credits.****ENGR 690. Graduate Seminar. 1-5 Credits.****ENGR 696. Special Topics. 1-5 Credits.****ENGR 722. Academic Writing in the Engineering Disciplines. 3 Credits.**

Students will learn to effectively use structural elements of academic writing by analyzing published papers. They will also work on sentence-level clarity and draft their own papers for publication. Restrictions: Enrollment is limited to graduate students in the College of Engineering or graduate students whose advisers are faculty members in the College of Engineering.

ENGR 729. Machine Learning for Engineers. 3 Credits.

This is an introductory course for supervised machine learning. The students will become familiar with basic feature selection methods, classification and regression algorithms. Students will be expected to write simple codes in standard programming languages. Students without programming experience will be given directed readings and tutorials to cope up with coding part of this course.

ENGR 770. Quantitative Modeling. 3 Credits.

Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with IME 770.

ENGR 771. Probabilistic and Deterministic Methods. 3 Credits.

Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with IME 771.

ENGR 790. Seminar. 1-5 Credits.**ENGR 791. Temporary/Trial Topics. 1-5 Credits.****ENGR 793. Individual Study/Tutorial. 1-5 Credits.****ENGR 899. Doctoral Dissertation. 1-15 Credits.**

English (ENGL)

ENGL 110. College Composition I. 3 Credits.

Guided practice in the reading and writing of various genres for different situations and audiences. Includes research on the web and in the library. Prereq: English placement.

ENGL 112. Multilingual College Composition I. 3 Credits.

Guided practice in college-level reading, writing, and critical thinking. Includes process writing, genres and an introduction to library research. Reserved for international or multilingual students. Equivalent to ENGL 110. Prereq: English placement.

ENGL 120. College Composition II. 3 Credits.

Advanced practice in reading and writing of various genres for different situations and audiences. Includes field research, collaboration, and visual communication. Prereq: ENGL 110 or placement.

ENGL 121. Honors Composition II. 3 Credits.

Accelerated practice in college-level writing for qualified students with skills in research and argumentation. Essays using library research and summaries, paraphrases, and quotations from relevant sources. Requires enrollment in the Scholars Program. Equivalent to ENGL 120. Prereq: ENGL 111.

ENGL 122. Multilingual College Composition II. 3 Credits.

Advanced practice in reading and writing of various genres for different situations and audiences. Includes field research, collaboration, and visual communication. Reserved for international or multilingual students. Equivalent to ENGL 120. Prereq: ENGL 110 or ENGL 112 or English placement.

ENGL 150. Being Human. 3 Credits.

Explore diverse cultures and contexts through fiction, non-fiction, visual, or other texts.

ENGL 167. Introduction to English Studies. 3 Credits.

An introduction to the different areas of English studies including literature, writing studies, and linguistics and the ways in which they are studied.

ENGL 194. Individual Study. 1-3 Credits.**ENGL 196. Field Experience. 1-15 Credits.****ENGL 199. Special Topics. 1-5 Credits.****ENGL 209. Introduction to Linguistics. 3 Credits.**

Entry-level knowledge for the scientific study of language, including such topics as phonetics, phonology, morphology, semantics, grammar, social and cultural dimensions, acquisition, variation and similarities among languages of the world, and related cultural history. Cross-listed with ANTH 209.

ENGL 213. Literary Publications. 3 Credits.

Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 220. Introduction to Literature. 3 Credits.

Reading and discussion of representative examples of poetry, drama, and fiction, with emphasis on the use of common literary terminology. Classic and contemporary works. Focus on enjoyment and appreciation of verbal art.

ENGL 222. Introduction to Poetry. 3 Credits.

Examination of poetic forms including the uses of figurative language and the techniques of rhythm and meter, as well as imagery and structure. Includes traditional and contemporary lyrics. Prereq: ENGL 120.

ENGL 225. Introduction to Film. 3 Credits.

General introduction to film studies, including analysis of narrative and stylistic elements of films for their artistic merits and their reflection of an influence on society.

ENGL 229. Introduction to Creative Writing. 3 Credits.

Introduction to the craft of creative writing with an emphasis on exploring multiple genres and developing a strong cultural awareness through readings and discussion.

ENGL 240. World Literature Masterpieces. 3 Credits.

Study of representative cultural and literary materials from the ancient world to modern times. Prereq or Coreq: ENGL 120.

ENGL 251. British Literature I. 3 Credits.

Survey of major works and writers in British literature from the Anglo-Saxon period through the 18th century. Prereq: ENGL 120.

ENGL 252. British Literature II. 3 Credits.

Survey of major works and writers in British literature from the Romantic Age to the present. Prereq: ENGL 120.

ENGL 261. American Literature I. 3 Credits.

Survey of major works and writers in American literature from the colonial period through the Civil War. Emphasis on the development of unique American values and literature. Prereq: ENGL 120.

ENGL 262. American Literature II. 3 Credits.

Survey of major works and writers in American literature from the Civil War to the present. Includes traditional as well as experimental, innovative, and counter-cultural works and authors. Prereq: ENGL 120.

ENGL 272. Literary Analysis. 3 Credits.

Introduction to traditional and contemporary literary and critical theory and to the fundamental skills required for the analysis of literary or other texts. Prereq: ENGL 120.

ENGL 275. Introduction to Writing Studies. 3 Credits.

A broad history of writing and rhetoric as well as an introduction to spheres of writing studies: creative, academic, professional/technical, and public writing. Prereq: ENGL 120.

ENGL 291. Seminar. 1-3 Credits.**ENGL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 294. Individual Study. 1-5 Credits.**ENGL 299. Special Topics. 1-5 Credits.****ENGL 301. Peer Tutoring and Writing in the Disciplines. 3 Credits.**

Introduction to individual writing instruction and conventions of disciplinary writing. In addition to classroom work and assignments, students will complete a practicum in the Center for Writers. Recommended for prospective educators, writing specialists in all fields, and peer tutors in the Center for Writers. Prereq: ENGL 120.

ENGL 313. Literary Publications II. 3 Credits.

Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 320. Business and Professional Writing. 3 Credits.

Intensive practice employing the conventions of writing needed in professional genres and settings: writing for specific audiences and purposes. Inform, analyze, evaluate, and persuade. Prereq: ENGL 120, Junior standing.

ENGL 321. Writing in the Technical Professions. 3 Credits.

Intensive practice employing the conventions of professional genres to write about technology development and use for expert, business, and more general audiences. Prereq: ENGL 120, Junior standing.

ENGL 322. Writing and the Creative Process. 3 Credits.

Exploring genres that fuel creativity and critical awareness. Emphasis on flexibility and inventiveness in realizing any personal or professional project. Products may range from poetry/fiction to blogs to student-designed assignments based on major. Prereq: ENGL 120, Junior standing.

ENGL 323. Creative Writing. 3 Credits.

Creative writing with a focus on one literary genre. May be repeated for credit. Prereq: ENGL 120 and any one of the following: ENGL 229, ENGL 275 or ENGL 322.

ENGL 324. Writing in the Sciences. 3 Credits.

The study and practice in written conventions of the sciences for academic, scientific, and public audiences. Prereq: ENGL 120, Junior standing.

ENGL 325. Writing in the Health Professions. 3 Credits.

Study of and practice in language use and written conventions of the health professions for academic, scientific, and public audiences. Prereq: ENGL 120 and Junior standing.

ENGL 326. Writing in the Design Professions. 3 Credits.

This course provides intensive practice employing the conventions of those professional genres needed to write for professional contexts and audiences in design fields. Prereq: ENGL 120, Junior standing.

ENGL 330. Women's Writing. 3 Credits.

Study of writing (and other texts) produced by women of various cultural, ethnic, or national backgrounds from a variety of time periods. May be repeated for credit. Prereq: ENGL 120.

ENGL 333. Fantasy and Science Fiction. 3 Credits.

Study of social and psychological implications of fantasy literature and works of fiction concerned with the impact of science and technology on the human imagination. Prereq: ENGL 120.

ENGL 335. Multicultural Writers. 3 Credits.

Major literary figures within and outside the United States. Includes Asian, Mexican, and Canadian, as well as Native-American, Black, Asian-American, and Chicano writers. Prereq: ENGL 120.

ENGL 336. Literature and The Environment. 3 Credits.

Milestones of American writing about nature and culture from Thoreau to the present. Reading and analysis of literary encounters with place and issues that arise when the local is global. Prereq: ENGL 120.

ENGL 340. 19th Century American Fiction. 3 Credits.

Selected fiction reflecting problems and ideas, emphasizing the shift from romanticism to realism and naturalism, of the 19th century. Representative writers: Cooper, Hawthorne, Twain, Jewett, James, and Wharton, and includes minority voices. Prereq: ENGL 120.

ENGL 341. Contemporary American Fiction. 3 Credits.

Explores selected fiction reflecting social, psychological and literary trends in the 20th and 21st centuries. Includes discussion of multicultural and women authors, as well as experimentations in genre. Prereq: ENGL 120.

ENGL 345. Themes in American Culture. 3 Credits.

A multidisciplinary approach, including art, music, and literature, to various eras and themes in American cultural history. Prereq: ENGL 120.

ENGL 357. Visual Culture and Language. 3 Credits.

This course will cover the rise of visual culture and the impact this historical shift has made on print culture and writing. Students will produce information graphics, photo essays, videos, and other genres. Prereq: ENGL 120, Junior standing.

ENGL 358. Writing in the Humanities and Social Sciences. 3 Credits.

Theory and practice for writing multiple genres in the humanities and social sciences. Prereq: ENGL 120, Junior standing.

ENGL 360. Grammatical Structure/English. 3 Credits.

Examines the system of the English sentence. Emphasis on structures and components with attention to application in teaching, stylistic analysis, and editing.

ENGL 375. The Bible as Literature. 3 Credits.

Study of the texts of the Hebrew Bible and New Testament, with an emphasis on the documents' historical and cultural settings, their global influence, and current rhetorical and literary interpretative methods. Prereq: ENGL 120.

ENGL 376. Poetry of Rock. 3 Credits.

Examination of rock lyrics as contemporary poems, using techniques of literary criticism to analyze their themes, their aesthetic principles, and their place in art and culture.

ENGL 377. Modern Poetry. 3 Credits.

Experimentation and innovation in poetry from 1910 to 1945. American, English, and Irish poets, including such transnational writers as Eliot, Pound, H.D., D.H. Lawrence, and Auden. May be repeated. Prereq: ENGL 120.

ENGL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENGL 380. Shakespeare. 3 Credits.

Study of representative poetry, comedies, histories, and tragedies. Prereq: ENGL 120.

ENGL 382. Film Genres and Styles. 3 Credits.

Study of one or more film genres, styles, or movements, focusing on aesthetic conventions, cultural context, socio-historical significance, and critical approaches. May be repeated with change of topic. Prereq: THEA 115 or ENGL 225 or ENGL 272.

ENGL 385. British Fiction. 3 Credits.

Examines significant works of British and their literary artistry. short and long fiction in terms of their cultural, social, and psychological content. Prereq: ENGL 120.

ENGL 389. Non-fiction Prose. 3 Credits.

Examines non-fiction prose in its various forms as a significant literary genre capable of exploring cultural, social, historical, psychological, and philosophical matters with logic, emotional power, and literary artistry. Prereq: ENGL 120.

ENGL 391. Seminar. 1-3 Credits.**ENGL 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 394. Individual Study. 1-5 Credits.**ENGL 396. Field Experience. 1-15 Credits.**

Field Experience.

ENGL 399. Special Topics. 1-5 Credits.**ENGL 413. Literary Publications III. 3 Credits.**

Theory and practice in the process of producing a literary magazine. Prereq: ENGL 120.

ENGL 423. Creative Writing Studio. 3 Credits.

Advanced creative writing with an emphasis on the student as working writer. Readings in creative and/or critical texts and participation in community events. Intensive workshop discussion, with the goal of producing a publishable manuscript. Prereq: ENGL 275, ENGL 322 or ENGL 323.

ENGL 435. Young Adult Literature in a Multicultural World. 3 Credits.

Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 635.}.

ENGL 449. Usability and User Experience. 3 Credits.

This course will form the basis for teaching the core competencies for working in the English department UX lab. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for graduate credit - see ENGL 649}.

ENGL 452. History of the English Language. 3 Credits.

Development of the English language from its Germanic origins to the modern period. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 652}.

ENGL 453. Social and Regional Varieties of English. 3 Credits.

Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. Prereq: ENGL 120. Recommended: ENGL 209. {Also offered for graduate credit - see ENGL 653}.

ENGL 454. Language Bias. 3 Credits.

Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. Prereq: ENGL 120. {Also offered for graduate credit - see ENGL 654}.

ENGL 455. International Technical Writing. 3 Credits.

Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. Prereq: ENGL 120, Junior standing. {Also offered for graduate credit - see ENGL 655}.

ENGL 456. Literacy, Culture and Identity. 3 Credits.

Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. Prereq: ENGL 272 or ENGL 275, Junior standing. {Also offered for graduate credit - see ENGL 656}.

ENGL 457. Electronic Communication. 3 Credits.

This web-based class will explore issues related to electronic communication through selected readings, projects that allow students to develop skills and insight through experiential learning, and through reflection on the dynamics of online education itself. Prereq: ENGL 120.

ENGL 458. Advanced Writing Workshop. 3 Credits.

Writing, revising, and editing projects based on rhetorical principles. Frequent response from peers and instructor. Analysis of selected readings and students' own writing. Prereq: Any one of the following: ENGL 320, ENGL 321, ENGL 322, ENGL 323, ENGL 324, ENGL 325, ENGL 326 or ENGL 358.

ENGL 459. Researching and Writing Grants and Proposal. 3 Credits.

A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. Prereq: ENGL 120 and Junior standing. {Also offered for graduate credit - see ENGL 659}.

ENGL 467. English Studies Capstone Experience. 3 Credits.

Cumulative and integrative study for English majors of English language, literature, and composition. Prereq: ENGL 272.

ENGL 472. 20th Century American Writers. 3 Credits.

Intensive study of major American writers from 1900 to 1950. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 672}.

ENGL 474. Native American Literature. 3 Credits.

The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 674}.

ENGL 476. Topics in American Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 676}.

ENGL 480. Medieval Literature. 3 Credits.

British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 680}.

ENGL 482. Renaissance Literature. 3 Credits.

Study of British writers of the 16th and 17th centuries. Prereq: ENGL 272. {Also offered for undergraduate credit - see ENGL 682}.

ENGL 483. Topics in British Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 683}.

ENGL 486. Romantic Literature. 3 Credits.

Study of major British writers from the French Revolution to the coronation of Queen Victoria. Prereq: ENGL 272. {Also offered for graduate credit - see ENGL 686}.

ENGL 491. Seminar. 1-5 Credits.**ENGL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 493. Undergraduate Research. 1-5 Credits.**ENGL 494. Individual Study. 1-5 Credits.****ENGL 496. Field Experience. 1-15 Credits.****ENGL 499. Special Topics. 1-5 Credits.****ENGL 635. Young Adult Literature in a Multicultural World. 3 Credits.**

Introduction to the field of Young Adult Literature (YAL) with an emphasis on multicultural novels. Recommended for English Education majors, English majors seeking breadth in their reading, and students seeking diverse reading. {Also offered for undergraduate credit - see ENGL 435.}

ENGL 649. Usability and User Experience. 3 Credits.

This course will form the basis for teaching the core competencies for working in the English department UX lab. Additionally, it will prepare students to collaborate with design teams to create better documentation, to create fuller user understandings of user inscription preferences, and to craft information strategies. This course will teach user inquiry methods, data collection, genre conventions, and rhetorical strategies for user advocacy. {Also offered for undergraduate credit - see ENGL 449.}

ENGL 652. History of the English Language. 3 Credits.

Development of the English language from its Germanic origins to the modern period. {Also offered for undergraduate credit - see ENGL 452.}

ENGL 653. Social and Regional Varieties of English. 3 Credits.

Study of sociological factors as they relate to language (American English). Examines region, age, gender, ethnicity, self-identity, situation, profession, etc. and their relation to pronunciation, word choice, politeness, formality, turn-taking, etc. Students conduct original research. {Also offered for undergraduate credit - see ENGL 453.}

ENGL 654. Language Bias. 3 Credits.

Application of current linguistic, rhetorical, and literary theory to examine and analyze the ways in which the social asymmetries of gender, sexuality, race, and ethnicity are reflected and sustained through discourse practices. {Also offered for undergraduate credit - see ENGL 454.}

ENGL 655. International Technical Writing. 3 Credits.

Theories and practical applications of approaches to international technical documents, including globalization, localization, and translation preparations and procedures. Extensive use of case studies and cultural models. {Also offered for undergraduate credit - see ENGL 455.}

ENGL 656. Literacy, Culture and Identity. 3 Credits.

Reading, writing, research, and discussion of diverse types of literacy from functional to cultural to technological and their roles in culture and identity formation. Completion of related community projects. {Also offered for undergraduate credit - see ENGL 456.}

ENGL 659. Researching and Writing Grants and Proposal. 3 Credits.

A rhetorical approach to researching and writing academic grants, business proposals, and related professional documents. Students develop a portfolio of professionally designed and edited documents as well as the vocabulary of grants writing and research. {Also offered for undergraduate credit - see ENGL 459.}

ENGL 672. 20th Century American Writers. 3 Credits.

Intensive study of major American writers from 1900 to 1950. {Also offered for undergraduate credit - see ENGL 472.}

ENGL 674. Native American Literature. 3 Credits.

The development of literature by and about Native Americans is traced from 1850 to the present. Focus on Native American identity and contributions to the American culture. {Also offered for undergraduate credit - see ENGL 474.}

ENGL 676. Topics in American Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation and development of American literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 476.}

ENGL 680. Medieval Literature. 3 Credits.

British poetry and prose from the beginning of the Middle Ages to 1500, excluding Chaucer. {Also offered for undergraduate credit - see ENGL 480.}

ENGL 682. Renaissance Literature. 3 Credits.

Study of British writers of the 16th and 17th centuries. {Also offered for undergraduate credit - see ENGL 482.}

ENGL 683. Topics in British Literature. 3 Credits.

Intensive study of a special theme, form, period, or group of writers central to the formation of British literature. May be repeated with change of topic. {Also offered for undergraduate credit - see ENGL 483.}

ENGL 686. Romantic Literature. 3 Credits.

Study of major British writers from the French Revolution to the coronation of Queen Victoria. {Also offered for undergraduate credit - see ENGL 486.}

ENGL 690. Graduate Seminar. 1-3 Credits.**ENGL 692. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENGL 695. Field Experience. 1-15 Credits.

Field-oriented supervised learning activities outside the college classroom that include a preplanned assessment of the experience, registration during the term the experience is conducted, and post evaluation with the instructor. Departmental approval.

ENGL 696. Special Topics. 1-5 Credits.**ENGL 751. Tools for Academic Writing: Clarity and Style. 1 Credit.**

Primary goal: Students will learn and practice using specific strategies for writing clear, correct, and audience-appropriate academic documents. In addition, they will investigate writing expectations and analyze academic writing in their own discipline. S/U grading.

ENGL 752. Tools for Academic Writing: Writing Your Manuscript. 1 Credit.

Semester-long intensive academic writing with extensive individualized feedback. Students develop a writing plan, obtain approval from their advisors, and write intensively, receiving regular individualized assistance from a graduate writing consultant. S/U grading.

ENGL 753. Rhetorics, Poetics Of New Media. 3 Credits.

This web-based class will provide in-depth study of major new media theorists and require students to consider the research and teaching implications of new media for the humanities and social sciences. . Prereq: Graduate standing.

ENGL 754. Rhetorics of Science and Technology. 3 Credits.

The study and critique of the rhetorics of science and technology, informed by rhetorical theory and by the philosophy of and the social studies of science and technology. Prereq: Graduate standing or instructor approval.

ENGL 755. Composition Theory. 3 Credits.

Study of contemporary theories of teaching writing with frequent summary/response papers on assigned readings and a research paper on composition theory.

ENGL 756. Composition Research. 3 Credits.

Study of designs and basic statistics for writing research; analysis of current research; and a research project in composition.

ENGL 758. Topics in Rhetoric, Writing, and Culture. 3 Credits.

Intensive study of a theme, form, period, theory or theorist, writer or group of writers, or issue in rhetoric, writing, and culture. May be repeated with change of topic.

ENGL 759. History of Writing Instruction. 3 Credits.

The study of the history of writing instruction from antiquity to the present, with emphasis on relevance of writing instruction. Prereq: Graduate standing or instructor approval.

ENGL 760. Graduate Scholarship. 3 Credits.

Introduction to scholarship in English studies and to the nature and state of the discipline.

ENGL 761. Writing: Invention to Innovation. 3 Credits.

Exploration of the use of rhetorical canon in writing, spanning a period from the Aristotelian concept of invention to the contemporary manifestation of innovation. Prereq: admission to English graduate program.

ENGL 762. Critical Theory. 3 Credits.

Study of contemporary literary theory and criticism.

ENGL 764. Classroom Strategies For TA'S. 3 Credits.

Introduction to current issues in composition pedagogy, research, and theory, focusing on how they inform teaching practices. Instruction on developing philosophy of and strategies for teaching through short position papers, literacy autobiography, and a sequence of assignments for ENGL 120.

ENGL 765. Upper Division Writing: Pedagogy, Practice, and Technology. 3 Credits.

Theory, practice, and pedagogy for teaching upper-division writing classes. Discussion will include a number of writing studies topics, including Writing across Curriculum (WAC), Writing in the Disciplines (WID), and writing program administration. Prereq: ENGL 764.

ENGL 766. Teaching Literature. 3 Credits.

Theory, practice, and pedagogy for teaching literature at the college and/or university level. This course focuses on literary genres, cultures, and theories in the context of pedagogy. Prereq: ENGL 764 or ENGL 765. Recommended prereq: ENGL 762.

ENGL 770. Studies in American Literature. 3 Credits.

Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of American literature. May be repeated for credit with change in topic.

ENGL 780. Studies in British Literature. 3 Credits.

Intensive study of a special period, theme, technique, or group of writers central to the formation, development, or flowering of British literature. May be repeated with change of topic.

ENGL 790. Graduate Seminar. 1-3 Credits.**ENGL 791. Temporary/Trial Topics. 1-5 Credits.****ENGL 792. Graduate Teaching Experience. 1-6 Credits.****ENGL 793. Individual Study/Tutorial. 1-5 Credits.****ENGL 794. Practicum. 1-8 Credits.****ENGL 795. Field Experience. 1-15 Credits.****ENGL 796. Special Topics. 1-5 Credits.****ENGL 797. Master's Paper. 1-3 Credits.****ENGL 798. Master's Thesis. 1-10 Credits.****ENGL 892. Graduate Teaching Experience. 1-6 Credits.****ENGL 893. Individual Study/Tutorial. 1-5 Credits.****ENGL 894. Practicum/Internship. 1-8 Credits.****ENGL 895. Field Experience. 1-15 Credits.****ENGL 899. Doctoral Dissertation. 1-15 Credits.**

Entomology (ENT)

ENT 194. Individual Study. 1-3 Credits.**ENT 196. Field Experience. 1-15 Credits.****ENT 199. Special Topics. 1-5 Credits.****ENT 210. Insects, Humans and the Environment. 3 Credits.**

Insect biology and its relevance to humans and the environment. 2 lectures.

ENT 291. Seminar. 1-3 Credits.**ENT 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 294. Individual Study. 1-5 Credits.**ENT 299. Special Topics. 1-5 Credits.****ENT 350. General Entomology. 3 Credits.**

Fundamental aspects of Entomology, including: insect classification, identification, structure, biology, adaptations, and impact on human society. 2 lectures, 1 two-hour laboratory. F.

ENT 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ENT 391. Seminar. 1-3 Credits.**ENT 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 394. Individual Study. 1-5 Credits.**ENT 399. Special Topics. 1-5 Credits.****ENT 431. Principles of Insect Pest Management. 3 Credits.**

This course focuses on integrated pest management of insects and related arthropods. The course will cover information and tactics relevant to using and developing IPM programs (e.g. pesticides, economic thresholds, biocontrol). Prereq: ENT 350. S (odd years) {Also offered for graduate credit - see ENT 631.}.

ENT 470. Insect Ecology. 3 Credits.

This course explores the importance of insects for investigating basic and applied ecological questions. We will primarily use the peer-reviewed literature to look at some of the most important issues in insect ecology. In doing so, we will look at the ecological foundations of these issues, the methods scientists use to research them, and their connections to management. The course will be online and asynchronous with regular deadlines to help maintain progress throughout the semester. Prereq: ENT 350. {Also offered for graduate credit - see ENT 670.}.

ENT 491. Seminar. 1-5 Credits.**ENT 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ENT 493. Undergraduate Research. 1-5 Credits.**ENT 494. Individual Study. 1-5 Credits.****ENT 496. Field Experience. 1-15 Credits.****ENT 499. Special Topics. 1-5 Credits.****ENT 631. Principles of Insect Pest Management. 3 Credits.**

This course focuses on integrated pest management of insects and related arthropods. The course will cover information and tactics relevant to using and developing IPM programs (e.g. pesticides, economic thresholds, biocontrol). S (odd years) {Also offered for undergraduate credit - see ENT 431.}.

ENT 670. Insect Ecology. 3 Credits.

This course explores the importance of insects for investigating basic and applied ecological questions. We will primarily use the peer-reviewed literature to look at some of the most important issues in insect ecology. In doing so, we will look at the ecological foundations of these issues, the methods scientists use to research them, and their connections to management. The course will be online and asynchronous with regular deadlines to help maintain progress throughout the semester. {Also offered for undergraduate credit - see ENT 470.}.

ENT 690. Graduate Seminar. 1-3 Credits.**ENT 695. Field Experience. 1-15 Credits.****ENT 696. Special Topics. 1-5 Credits.****ENT 741. Insect-Plant Interactions. 3 Credits.**

Insect-plant interactions are a key feature of the terrestrial ecology of our planet. The course will cover plant interactions with both herbivores and pollinators, and will emphasize the behavioral mechanisms insects use to exploit plants.

ENT 750. Systematic Entomology. 5 Credits.

Introduction to systematic methods and principles; identification of common families of insects. F (even years).

ENT 751. Immature Insects. 3 Credits.

Characteristics of the immature forms of the orders and principal families of insects. Prereq: ENT 750. F (odd years).

ENT 760. Insect Structure. 4 Credits.

Structure of insects and physiological functions. The development of adult form from embryonic and larval precursors during growth and metamorphosis; evolutionary development of insect structures. F (odd years).

ENT 761. Insect Physiology. 4 Credits.

Function of major insect organ systems and metabolism, growth, and molting of insects. S (odd years).

ENT 770. Writing a Scientific Literature Review. 3 Credits.

Explore how and why to create a scientific literature review in this writing intensive class. Hands-on exercises will help improve scientific writing, peer-review, and self-assessment while working throughout the semester to create your own review.

ENT 790. Graduate Seminar. 1-3 Credits.**ENT 791. Temporary/Trial Topics. 1-5 Credits.****ENT 792. Graduate Teaching Experience. 1-6 Credits.****ENT 793. Individual Study/Tutorial. 1-5 Credits.****ENT 794. Practicum/Internship. 1-15 Credits.****ENT 795. Field Experience. 1-15 Credits.****ENT 796. Special Topics. 1-5 Credits.****ENT 798. Master's Thesis. 1-10 Credits.****ENT 899. Doctoral Dissertation. 1-15 Credits.**

Entrepreneurship (ENTR)

ENTR 201. Introduction to Entrepreneurship. 3 Credits.

Business majors and minors, non-business majors, and non-degree seeking students will receive an introduction to the entrepreneurial process, evaluating the market feasibility of new product and business ideas, and launching an entrepreneurial venture. Students will develop an understanding of the business concept and business model. They will develop a general understanding of the basic functional areas of business, and will have the opportunity to evaluate what entrepreneurship involves.

ENTR 301. Entrepreneurship Toolbox I. 3 Credits.

The course emphasizes the "soft" skills an entrepreneur will need during the early years of business formation and growth. It will provide students with a series of frameworks, skills and techniques that can be used in growing entrepreneurial businesses. Students will explore ways to shape and evaluate the viability of potential opportunities by understanding key industry factors, market and competitive factors and customer needs. Students will gain a better understanding of personal entrepreneurial capacity, team building and management. The course relies on non-traditional, experiential learning methods and cases to help students learn. Co-req: ENTR 201 or MGMT 470.

ENTR 401. Entrepreneurship Capstone. 3 Credits.

This course is designed to teach people with entrepreneurial aspirations a process for how to take an idea and turn it into a reality. Students will explore ways to shape and evaluate the viability of these opportunities by understanding key industry factors, market and competitive factors and customer needs. This course provides an opportunity for you to work with other students with varied skills and expertise in order to develop an entrepreneurial opportunity. The main purpose of this course is to allow you to work to develop a new business proposal by generating an idea, using business modeling techniques to "flesh out" that idea and define the venture opportunity, moving through the customer research and development process, and assessing how to improve their new venture concept. Prereq: ENTR 201 or MGMT 470. Co-req: ENTR 301 or ENGR 310.

ENTR 440. International Entrepreneurship. 3 Credits.

This course teaches how to develop a feasible business model for international or immigrant entrepreneurs. Prereq: ENTR 201 or MGMT 470 and restricted to College of Business professional major or minor with an accumulative minimum 2.5 GPA.

ENTR 491. Seminar. 1-5 Credits.

ENTR 494. Individual Study. 1-5 Credits.

ENTR 496. Practicum/Internship. 1-15 Credits.

Environment & Conservation Science (ECS)

ECS 740. Environmental Management. 3 Credits.

Regional and global environmental issues, policies, and regulations. Integrated approach to control and prevention of environmental degradation. Methods for environmental data collection, analysis, and management. Environmental modeling. Environmental risk assessment, feasibility study, and decision making.

ECS 750. Environmental Decision Analysis. 3 Credits.

This course will teach students quantitative methods for analyzing problems involving uncertainty and multiple, conflicting objectives. Topics include subjective probability, utility, value of information, and multiple attribute methods. Students will apply these tools to current environmental problems. Prereq: Statistics course.

ECS 760. Environmental Impact Assessment. 3 Credits.

Analysis of environmental protection legislation, biological, physical and socioeconomic impacts. National Environmental Policy Act (NEPA) and related regulations. Prereq: ECS 750.

ECS 770. Environmental Law and Policy. 3 Credits.

Introduction of major federal and state statutes and regulatory programs that governs environmental quality, pollution control and wildlife management, including legislative enactment, regulatory development, enforcement, federal/state relationship and judicial interpretation.

ECS 790. Graduate Seminar. 1-3 Credits.

ECS 797. Master's Paper. 1-5 Credits.

ECS 798. Master's Thesis. 1-10 Credits.

ECS 899. Doctoral Dissertation. 1-15 Credits.

Environmental Design (ENVD)

ENVD 101. Introduction to Environmental Design. 3 Credits.

Introduction to the environmental design fields of city planning, urban design, landscape architecture, architecture, and interior design. Particular attention is given to basic design concepts, visualization, visual analysis, imagination, and creativity.

ENVD 102. Drawing Basics for Environmental Designers. 1 Credit.

Introduction to the conventions of graphic expression as employed in architecture and landscape architecture. Co-req: ENVD 130.

ENVD 104. Environmental Design Fundamentals. 1 Credit.

Introduction to environmental design fundamentals, including the elements and principles of design, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication. Co-req: ENVD 172.

ENVD 130. Drawing Skills for Environmental Designers. 3 Credits.

Introduction to the skills of graphic expression as employed in architecture and landscape architecture. Co-req: ENVD 102.

ENVD 172. Environmental Design Fundamentals Studio. 3 Credits.

Introduction to design studio, with practice in representational media, techniques and skills exploring drawing, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication. Co-req: ENVD 104.

Environmental Engineering (ENVE)

ENVE 111. Introduction to Environmental Engineering. 1 Credit.

Introduction to the environmental engineering discipline; overview of the design process and pertinent regulations; exposure to professional ethics and licensure; and, development of technical, communication, and presentation skills. One 2 hr. lab per week.

ENVE 211. Analysis and Design Methods for Environmental Engineers. 1 Credit.

Exposure to real-life environmental design, analysis, and processes. This will include an overview of contemporary software, exposure to sustainability, cultural, global, environmental, social, risk, and economic considerations. 1 three-hour lab. Prereq: ENVE 111.

ENVE 250. Fundamentals of Environmental Engineering. 3 Credits.

Fundamental principles in environmental engineering; basic principles of calculation; introduction to mass and energy balances; chemical stoichiometry; biology, microbiology, biochemistry, and enzyme kinetics; risk and uncertainty; and, fundamental concepts for assessing sustainability. 3 one-hour lectures. Prereq: ENVE 211 and MATH 165. Co-req: CHEM 240.

ENVE 350. Microbiological Principles for Environmental Engineers. 3 Credits.

Overview of microbiology for natural and engineered systems; fundamentals of microbiology for water/wastewater treatment and hazardous waste remediation; microbial risk assessment; microbial kinetics. 3 one-hour lectures. Prereq: ENVE 250.

ENVE 360. Environmental Chemistry for Water and Wastewater. 3 Credits.

Chemical principles applied to surface water quality issues in water supply, wastewater treatment, natural water/pollution. Includes coverage of organic loads, trace metals, organic compounds, nutrients, solids, disinfectants, and dissolved oxygen. 3 one-hour lectures. Prereq: ENVE 250.

ENVE 370. Sustainability Engineering. 3 Credits.

Social, economic, and environmental aspects of sustainable design, including regulations; introduction to life cycle assessment and environmental impacts; overview of GIS and risk assessment; and use of probability and statistics to understand uncertainty. Three 1-hour lectures. Prereq: MATH 266 and ENVE 250.

ENVE 412. Unit Operations and Processes. 2 Credits.

Application of physical and chemical operations and biological processes in environmental engineering. Topics include biokinetics, coagulation/flocculation, absorption, gas stripping, and bench-scale projects. 1 one-hour lecture and 1 three-hour lab. Prereq: ENVE 360.

ENVE 450. Environmental Engineering Chemistry Laboratory. 1 Credit.

Water chemistry laboratory; technical communication and statistical analyses. 1 three-hour laboratory. Prereq: ENVE 360 and ENGL 321.

ENVE 460. Environmental Fate and Transport. 3 Credits.

Introduction to the major physical, chemical, and biological processes of pollutant transformation and transport between air, water, and the subsurface. Three, one-hour lectures. Prereq: CE 309 and ENVE 360.

ENVE 488. Senior Design I. 2 Credits.

Application of cumulative knowledge gained during academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Initial preliminary design incorporate economic, social, environmental, regulatory, sustainable, and risk-based analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENGR 402, ENVE 370, and ENVE 412. Co-req: IME 440 and CE 410.

ENVE 489. Senior Design II. 2 Credits.

Application of cumulative knowledge gained during the academic career towards the design of environmental systems for the minimization, treatment/disposal, and/or destruction of wastes across all pertinent media. Field, lab, and/or literature work/data collection/experimentation will be undertaken by the design teams to collect data needed for the final design of the project begun during ENVE 488. Final designs will incorporate economic, social, environmental, regulatory, sustainable, life-cycle, and risk-based/uncertainty analyses and requirements; along with ethical judgement. Two, 3-hour labs (studio style). Prereq: ENVE 488.

Finance (FIN)

FIN 320. Principles of Finance. 3 Credits.

Various concepts and analytical tools in business finance. Includes financial mathematics, valuation, financial analysis and planning, funding sources, capital budgeting, cost of capital, leverage, dividend policy, and working capital management. Prereq: restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

FIN 397. Fe/Coop Ed/Internship. 1-15 Credits.**FIN 410. Investment Analysis and Management. 3 Credits.**

Evaluation of various securities for investment (stocks, bonds), investment analysis (fundamental and technical), concepts of efficient markets, and market risk. Portfolio management and international investment aspects are briefly covered. Prereq: FIN 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 610.}.

FIN 413. Finance Service Internship. 1-3 Credits.

Supervised professional finance work experience in a non-paid position. Prereq: FIN 320 with a grade of C or better and students must be a junior or a senior admitted to a professional program in the College of Business with a minimum cumulative NDSU GPA of 2.5.

FIN 420. Options, Futures, and Other Derivatives. 3 Credits.

Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: FIN 410 with a grade of C or better and restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 620.}.

FIN 430. Management of Financial Institutions. 3 Credits.

Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. Prereq: FIN 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 630.}.

FIN 440. International Finance. 3 Credits.

Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. Prereq: FIN 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 640.}.

FIN 450. Advanced Bank Management. 3 Credits.

This course provides an in-depth examination of the financial services industry, with a focus on depository institutions. Topics will include profitability, bank regulation and examination, lending, enterprise risk management, deposit operations, and several others. This course includes a bank profitability simulation and examines several topics from Finance 430 at a deeper level, along with a number of new topics. Prereq: FIN 430. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 650.}.

FIN 451. Credit Analysis. 3 Credits.

This course provides an in-depth examination of lending, with an emphasis on commercial credit. It will closely follow the Credit Essentials Course from the Risk Management Association, with the goal of preparing students for the Credit Essentials Certificate Examination through RMA at the end of the semester. Topics will include identifying customer needs, analyzing financial statements, loan structuring and documentation, and problem loan identification. Prereq: FIN 320 and students must be College of Business Administration professional major or minor, and a GPA over 2.50.

FIN 460. Corporate Finance. 3 Credits.

This course is an extension of FIN 320 with specific focus on the time value of money, risk and return trade-off, capital structure and firm value, project analysis, dividend policies, and financial case analysis. Prereq: FIN 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

FIN 470. Analysis of Fixed-Income Securities. 3 Credits.

An introduction to the valuation of fixed-income securities and the management of fixed-income investments. Prereq: FIN 320 with a grade of C or better and students must be admitted to a professional program in the College of Business with a minimum cumulative NDSU GPA of 2.5. {Also offered for graduate credit - See FIN 670.}.

FIN 480. Applied Portfolio Management. 3 Credits.

This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management through application. Students will gain real-time, hands-on experience in financial security analysis and valuation, asset allocation and portfolio management as applied to an actual investment portfolio. Students will also learn how to present their analysis of portfolio performance. Prereq: FIN 410 with a grade of C or better. {Also offered for graduate credit - See FIN 680.}.

FIN 491. Seminar. 1-5 Credits.**FIN 494. Individual Study. 1-5 Credits.****FIN 499. Special Topics. 1-5 Credits.****FIN 610. Investment Analysis and Management. 3 Credits.**

Evaluation of various securities for investment (stocks, bonds), investment analysis (fundamental and technical), concepts of efficient markets, and market risk. Portfolio management and international investment aspects are briefly covered. {Also offered for undergraduate credit - see FIN 410.}.

FIN 620. Options, Futures, and Other Derivatives. 3 Credits.

Evaluation of options, futures, and other derivative securities used for hedging, speculation, and arbitrage. Related market structure, trading strategies, and risks are examined. Prereq: FIN 610 with a grade of C or better. {Also offered for undergraduate credit - see FIN 420.}.

FIN 630. Management of Financial Institutions. 3 Credits.

Development, role, and functions of depository financial institutions. Emphasis on domestic and international regulation, structure, management, and operations of commercial banks. {Also offered for undergraduate credit - see FIN 430.}.

FIN 640. International Finance. 3 Credits.

Concerns international financial markets, exchange rates, currency futures, and options. Includes financial aspects of international corporations such as management of corporate assets and liabilities, capital structure, cost of capital, capital budgeting, and international risks. {Also offered for undergraduate credit - see FIN 440.}.

FIN 650. Advanced Bank Management. 3 Credits.

This course provides an in-depth examination of the financial services industry, with a focus on depository institutions. Topics will include profitability, bank regulation and examination, lending, enterprise risk management, deposit operations, and several others. This course includes a bank profitability simulation and examines several topics from Finance 630 at a deeper level, along with a number of new topics. Prereq: FIN 630. {Also offered for undergraduate credit - see FIN 450.}.

FIN 670. Analysis of Fixed-Income Securities. 3 Credits.

An introduction to the valuation of fixed-income securities and the management of fixed-income investments. {Also offered for undergraduate credit - See FIN 470.}.

FIN 680. Applied Portfolio Management. 3 Credits.

This course combines theory with practice and provides students with a unique educational opportunity to study portfolio management through application. Students will gain real-time, hands-on experience in financial security analysis and valuation, asset allocation and portfolio management as applied to an actual investment portfolio. Students will also learn how to present their analysis of portfolio performance. {Also available for undergraduate credit - See FIN 480.}.

Food Safety (SAFE)

SAFE 452. Food Laws and Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. {Also offered for graduate credit - see SAFE 652.}.

SAFE 484. Food Safety Practicum. 1-3 Credits.

Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for graduate credit - see SAFE 684.}.

SAFE 485. Risk and Crisis Communication. 3 Credits.

Crisis communication practices in organizations of all types with emphasis on planning, emergency communication, image restoration, and organizational learning. Prereq: COMM 110. Cross-listed with COMM 485.

SAFE 494. Individual Study. 1-5 Credits.**SAFE 652. Food Laws and Regulations. 3 Credits.**

Regulations, laws, and dynamics governing development of food policy. Cross-listed with CFS 652 and AGECE 652. {Also offered for undergraduate credit - see SAFE 452.}.

SAFE 684. Food Safety Practicum. 1-3 Credits.

Supervised experience to give students hands-on practice at addressing food safety problems. Placement with industry, government or academic settings will be arranged. Program permission required for registration. May be repeated for credit. {Also offered for undergraduate credit - see SAFE 484.}.

SAFE 720. Food Safety Costs and Benefits Analysis. 3 Credits.

Theoretical and empirical impacts of food safety costs and benefits. Three lectures. Prereq: SAFE 670, AGECE 741. Cross-listed with AGECE 720.

SAFE 725. Food Policy. 3 Credits.

Provides quantitative tools and models used to analyze general food safety policies. Three lectures. Prereq: SAFE 670. Cross-listed with AGECE 725 and CFS 725.

SAFE 753. Food Toxicology. 2 Credits.

Discussions on the properties of toxic substances found both naturally and as contaminants in foods, the hazards they present to humans and their food supplies, and ways to reduce risks.

SAFE 785. Advanced Crisis Communication. 3 Credits.

Long- and short-term issues for managing communication related to organizational crises are discussed in the stages of pre-crisis, crisis and post-crisis.

SAFE 786. Risk Communication. 3 Credits.

Explores the relationship between communication strategies and risk perception, assessment, and management. Cross-listed with COMM 786.

SAFE 790. Graduate Seminar. 1-3 Credits.

SAFE 791. Temporary/Trial Topics. 1-5 Credits.

SAFE 793. Individual Study/Tutorial. 1-5 Credits.

SAFE 794. Practicum/Internship. 1-10 Credits.

SAFE 795. Field Experience. 1-15 Credits.

SAFE 796. Special Topics. 1-5 Credits.

SAFE 797. Master's Paper. 1-3 Credits.

SAFE 798. Master's Thesis. 1-10 Credits.

SAFE 899. Doctoral Dissertation. 1-15 Credits.

French (FREN)

FREN 101. First-Year French I. 4 Credits.

Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of French required.

FREN 102. First-Year French II. 4 Credits.

Basic structures and vocabulary of French. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: FREN 101.

FREN 191. Seminar. 1-5 Credits.

FREN 194. Individual Study. 1-5 Credits.

FREN 196. Field Experience. 1-15 Credits.

FREN 199. Special Topics. 1-5 Credits.

FREN 201. Second-Year French I. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 102.

FREN 202. Second-Year French II. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: FREN 201.

FREN 220. French and Francophone Culture. 3 Credits.

Exploration of French and Francophone culture (including everyday culture, film, literature, politics, history, geography, etc.). A broad overview of cultural aspects of French-speaking societies. No prerequisites. Taught in English.

FREN 291. Seminar. 1-3 Credits.

FREN 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 294. Individual Study. 1-5 Credits.

FREN 299. Special Topics. 1-5 Credits.

FREN 311. French Conversation and Composition I. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 312. French Conversation and Composition II. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: FREN 202.

FREN 315. Contemporary France. 3 Credits.

An interdisciplinary study of present-day France; discussion of the political, social, and cultural context, including a brief historical overview and the role of France within the global community. Taught in French. Prereq: FREN 312.

FREN 340. The French-Speaking World. 3 Credits.

Study of works by Francophone writers and the history and cultures that influence their writings. Taught in French. Repeatable for credit with change in topic. Prereq: FREN 312 or equivalent.

FREN 345. Women in French Literature. 3 Credits.

Study of works by French and Francophone women writers of different literary periods; portrayals of women by French male and female authors. Taught in English and French.

FREN 350. Introduction to French Linguistics and Pronunciation. 3 Credits.

Study of the basic nature and function of languages as applied to French. Application of principles of phonetics to the pronunciation of the French language, plus extended practice in diction and intonation. Prereq: FREN 312.

FREN 360. Studies in Language and Style. 3 Credits.

Focus on the theory and practice of writing in multiple genres in French. Taught in French. Prereq: FREN 312, ENGL 120 and junior standing.

FREN 365. Advanced Conversation Through Contemporary Culture. 3 Credits.

Advanced practice oral skills in the context of contemporary current events in France and the Francophone world; may be repeated for credit. Taught in French. Prereq: FREN 312.

FREN 370. Translation: Practice and Theory. 3 Credits.

Introduction to basic concepts, strategies, and issues in translation; practice and development of skills and techniques for translation of a wide variety of texts. Taught in French and English. Prereq: FREN 312. May be repeated for credit.

FREN 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

FREN 381. Masterpieces of French Literature in Translation. 3 Credits.

Designed for those with no background in French. Introduction to important writers of several periods. Taught in English. Does not count toward a French major or minor.

FREN 391. Seminar. 1-3 Credits.**FREN 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 394. Individual Study. 1-5 Credits.**FREN 399. Special Topics. 1-5 Credits.****FREN 401. Approaches to Literature. 3 Credits.**

Introduction to a variety of critical approaches to literature; how to read, understand, and write about French and Francophone texts from various genres and periods. Taught in French. Prereq: FREN 312.

FREN 410. French Literature & Culture before 1800. 3 Credits.

Overview of the cultural and political history of France before the Revolution and an introduction to important writers and artists through representative works. Taught in French. Prereq: FREN 312.

FREN 412. French Literature & Culture since 1800. 3 Credits.

Overview of the cultural and political history of France since the Revolution and an introduction to important authors and artists through representative works. Taught in French. Prereq: FREN 312. (alternate years).

FREN 420. Themes & Topics in French Literature & Culture. 3 Credits.

Exploration of a significant theme or topic in French or Francophone literature and culture (e.g. the comic; philosophy & literature) not routinely included in the curriculum. May be repeated for credit with change in topic or theme. Taught in French. Prereq: FREN 312.

FREN 422. Genres in French Literature. 3 Credits.

In-depth study of works in French on a specific genre. Course may be repeated for credit with change in genre. Taught in French. Prereq: FREN 312.

FREN 489. Senior Thesis. 1 Credit.

Integrative capstone experience for seniors majoring in French; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in French and its oral presentation to faculty and departmental majors. Prereq: Senior standing; study abroad.

FREN 491. Seminar. 1-5 Credits.**FREN 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

FREN 494. Individual Study. 1-5 Credits.**FREN 496. Field Experience. 1-15 Credits.****FREN 499. Special Topics. 1-5 Credits.**

Geography (GEOG)

GEOG 105. Fundamentals of Geographic Information Systems. 3 Credits.

Basics of integration and analyses of spatial data to visualize relationships, seek explanations, and develop solutions to problems. Emphases are placed on the nature of geographic information and the ways digital methods support geographic analyses and modeling.

GEOG 151. Human Geography. 3 Credits.

Non-ethnocentric understanding of geography of human lifestyles and activities; their place and role in human-environment interaction.

GEOG 161. World Regional Geography. 3 Credits.

Study of geographic processes shaping major world regions and inter-relationships in the global village; geographic bases and implications of current world events.

GEOG 194. Individual Study. 1-3 Credits.**GEOG 196. Field Experience. 1-15 Credits.****GEOG 199. Special Topics. 1-5 Credits.****GEOG 262. Geography of North America. 3 Credits.**

Spatial approach to the development of the United States and Canada, which stresses changing cultural landscapes and assessing impacts of planning for resource utilization.

GEOG 291. Seminar. 1-3 Credits.**GEOG 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 294. Individual Study. 1-5 Credits.**GEOG 299. Special Topics. 1-5 Credits.****GEOG 379. Global Seminar. 1-6 Credits.**

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GEOG 391. Seminar. 1-3 Credits.**GEOG 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 394. Individual Study. 1-5 Credits.**GEOG 399. Special Topics. 1-5 Credits.****GEOG 412. Geomorphology. 3 Credits.**

Land forms and the processes by which they are formed and modified. Prereq: GEOL 105, GEOL 105L. Cross-listed with GEOL 412. {Also offered for graduate credit - see GEOG 612.}.

GEOG 455. Introduction to Geographic Information Systems. 4 Credits.

Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. {Also offered for graduate credit - see GEOG 655.}.

GEOG 456. Advanced Geographic Information Systems. 3 Credits.

Application and analysis of advanced techniques and principles of geographic information systems and remote sensing technologies to fully address spatial and time related problems related to urban site characterizations, hydrologi analyses, risk assessment, policy making, disaster response and strategic defense techniques. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Prereq: GEOG 455. {Also offered for graduate credit - see GEOG 656.}.

GEOG 465. Remote Sensing of the Environment. 3 Credits.

This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL 465. {Also offered for graduate credit - See GEOG 665.}

GEOG 470. Remote Sensing. 3 Credits.

Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for graduate credit - see GEOG 670.}.

GEOG 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.

Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOL 480. {Also offered for graduate credit - see GEOG 680.}.

GEOG 491. Seminar. 1-5 Credits.**GEOG 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOG 494. Individual Study. 1-5 Credits.**GEOG 496. Field Experience. 1-15 Credits.****GEOG 499. Special Topics. 1-5 Credits.****GEOG 612. Geomorphology. 3 Credits.**

Land forms and the processes by which they are formed and modified. Cross-listed with GEOL 612. {Also offered for undergraduate credit - see GEOG 412.}.

GEOG 655. Introduction to Geographic Information Systems. 4 Credits.

Application of the principles of geographic information systems and integrally related mapping to solve problems related to environment site characterizations, resource exploration, soil and groundwater contamination, geological and geotechnical investigations, waste management, construction, etc. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. {Also offered for undergraduate credit - see GEOG 455.}.

GEOG 656. Advanced Geographic Information Systems. 3 Credits.

Application and analysis of advanced techniques and principles of geographic information systems and remote sensing technologies to fully address spatial and time related problems related to urban site characterizations, hydrologic analyses, risk assessment, policy making, disaster response and strategic defense techniques. Comprehensive lab assignments included to give students hands-on experience solving problems with current state-of-the-art software and hardware, digitizers, scanners, and GPS units. Prereq: GEOG 655. {Also offered for undergraduate credit - see GEOG 456.}.

GEOG 665. Remote Sensing of the Environment. 3 Credits.

This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOL. {Also offered for undergraduate credit - See GEOG 465.}.

GEOG 670. Remote Sensing. 3 Credits.

Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOL. {Also offered for undergraduate credit - see GEOG 470.}.

GEOG 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.

Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOL 680. {Also offered for undergraduate credit - see GEOG 480.}.

GEOG 696. Special Topics. 1-5 Credits.

Geology (GEOL)

GEOL 105L. Physical Geology Lab. 1 Credit.

Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 105. Physical Geology. 3 Credits.

Study of the Earth as a physical body; its structure, composition, and the geologic processes acting on and within the Earth.

GEOL 106. The Earth Through Time. 3 Credits.

Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 106L. The Earth Through Time Lab. 1 Credit.

Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 107L. Geology of Red River Valley. 1 Credit.

Field study of Mesozoic and Cenozoic sediments, landforms, and geological processes that have shaped the landscape of the Red River Valley. Two-day field excursion and a report. Fee required. Recommended: GEOL 105 or GEOL 106.

GEOL 150. Concepts, Skills, and Ethics in Geoscience. 2 Credits.

This course introduces students to the geology major at NDSU. Students will learn basic skills for academic success along with specific skills and concepts in geosciences, including literature research, interdisciplinary scientific principles, field and lab safety, maps and geographic information systems, data analysis, computation and programming, and career paths in geoscience. The course will be team taught, with in-class active learning exercises, discussion, homework, and guest speakers.

GEOL 194. Individual Study. 1-5 Credits.**GEOL 196. Field Experience. 1-15 Credits.****GEOL 199. Special Topics. 1-5 Credits.****GEOL 201. The Geology of Climate Change and Energy. 3 Credits.**

Exploration and quantitative analysis of Earth system processes, geologic and instrumental records of global-scale climate change, and the interrelationship of climate change and energy consumption from fossil fuels.

GEOL 219. Oceanography. 3 Credits.

Ocean formation and dynamics over geologic time; waves and energy transfer of oceans; oceanic effects on world climates; coastal hazards.

GEOL 291. Seminar. 1-3 Credits.**GEOL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 294. Individual Study. 1-5 Credits.**GEOL 299. Special Topics. 1-5 Credits.****GEOL 300. Environmental Geology. 3 Credits.**

Human interaction with Earth's environment. Earthquakes, floods, volcanoes, landslides, water use, pollution, energy, mining, and land-use planning. Recommended: GEOL 105, GEOL 105L. (alternate years).

GEOL 301. Lake Superior Field Course. 2 Credits.

Stratigraphy, mineralogy, and economic geology of northern Minnesota and northwestern Ontario. Weekly lecture, plus six-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 302. Black Hills Field Course. 2 Credits.

Stratigraphy, structure, and mineralogy of the Black Hills and Williston Basin. Weekly lectures, plus seven-day field excursion. Offered periodically. Fee required. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L.

GEOL 303. Paleontology Field Course. 1 Credit.

Paleozoic stratigraphy and paleontology of southeastern Minnesota and northern Iowa. Lecture by arrangement, 1 three and one-half day field excursion. Fee required. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 310. Planetary Geology. 3 Credits.

Survey of planetary geology reinforcing concepts of physical geology; formation and composition of the solar system, comparative planetary geology and geomorphology, extra-solar systems and habitable worlds, astrobiology. Recommended: GEOL 105.

GEOL 350. Invertebrate Paleontology. 3 Credits.

Survey of invertebrate fossils emphasizing systematics, environments and as stratigraphic markers. Recommended: GEOL 106, GEOL 106L. (alternate years).

GEOL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GEOL 391. Seminar. 1-3 Credits.**GEOL 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 394. Individual Study. 1-5 Credits.**GEOL 397. Coop Ed/Internship. 1-4 Credits.****GEOL 399. Special Topics. 1-5 Credits.****GEOL 410. Sedimentology/Stratigraphy. 4 Credits.**

Origin and classification of sedimentary rocks and their stratigraphic relationships. 3 lectures, 1 laboratory. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L. (alternate years).

GEOL 412. Geomorphology. 3 Credits.

Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Recommended: GEOL 105, GEOL 105L. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 612.}.

GEOL 413. Glacial Geology. 3 Credits.

Glaciers as agents of geologic change; evolution of landforms and landscapes shaped by glaciers; glaciers and glacial landscapes as records of global climate and environmental change; glacial history of North America. Recommended: GEOL 105, GEOL 105L. {Also offered for graduate credit - see GEOL 613.}.

GEOL 414. Hydrogeology. 3 Credits.

Concepts of surface and groundwater hydrogeology in natural systems; the hydrologic cycle; physical properties of aquifers and subsurface flow; open channel flow; aqueous geochemistry. Prereq: GEOL 105, GEOL 105L, MATH 147 or MATH 166, PHYS 212 or PHYS 252, CHEM 122 or CHEM 161. {Also offered for graduate credit - see GEOL 614.}.

GEOL 420. Mineralogy. 3 Credits.

Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. Recommended: CHEM 121 or CHEM 150. (alternate years) {Also offered for graduate credit - see GEOL 620.}.

GEOL 421. Mineralogy Laboratory. 1 Credit.

Identification and classification of minerals using morphology, physical properties, XRF and XRD. Coreq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 621.}.

GEOL 422. Petrology. 3 Credits.

Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Prereq: GEOL 420. (alternate years) {Also offered for graduate credit - see GEOL 622.}.

GEOL 423. Petrography. 1 Credit.

Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Prereq: GEOL 422. (alternate years) {Also offered for graduate credit - see GEOL 623.}.

GEOL 428. Geochemistry. 3 Credits.

Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Recommended: CHEM 121 or CHEM 150. Cross-listed with CHEM 428. (alternate years) {Also offered for graduate credit - see GEOL 628.}.

GEOL 450. Field Geology. 3 Credits.

Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 410, GEOL 421, GEOL 423, GEOL 457. (alternate years) {Also offered for graduate credit - see GEOL 650.}.

GEOL 457. Structural Geology. 4 Credits.

Dynamics of rock deformation and analyses of Earth structure. Recommended: GEOL 105, GEOL 105L, MATH 105. (alternate years) {Also offered for graduate credit - see GEOL 657.}.

GEOL 460. Biogeochemistry. 3 Credits.

An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts. Recommended: GEOL 105, GEOL 105L, GEOL 106, GEOL 106L, CHEM 121, CHEM 122, BIOL 150, BIOL 151. {Also offered for graduate credit - see GEOL 660.}.

GEOL 465. Remote Sensing of the Environment. 3 Credits.

This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOG 465. {Also offered for graduate credit - See GEOL 665.}.

GEOL 470. Remote Sensing. 3 Credits.

Application of principles of Remote Sensing technology to integrate multiple interrelated data, to identify and/or accentuate spectral indices, magnetic force, electromagnetic energy and other remotely collected data to analyze temporal and spatial variation. Cross-listed with GEOG. {Also offered for graduate credit - see GEOL 670.}.

GEOL 480. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.

Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 455. Cross-listed with GEOG 480. {Also offered for graduate credit - see GEOL 680.}.

GEOL 491. Seminar. 1-5 Credits.**GEOL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GEOL 493. Undergraduate Research. 1-5 Credits.**GEOL 494. Individual Study. 1-5 Credits.****GEOL 496. Field Experience. 1-15 Credits.****GEOL 499. Special Topics. 1-5 Credits.****GEOL 612. Geomorphology. 3 Credits.**

Land forms and the processes by which they are formed and modified. 3 lectures, 1 two-hour laboratory. Cross-listed with GEOG. {Also offered for undergraduate credit - see GEOL 412.}.

GEOL 613. Glacial Geology. 3 Credits.

Glaciers as agents of geologic change; evolution of landforms and landscapes shaped by glaciers; glaciers and glacial landscapes as records of global climate and environmental change; glacial history of North America. {Also offered for undergraduate credit - see GEOL 413.}.

GEOL 614. Hydrogeology. 3 Credits.

Concepts of surface and groundwater hydrogeology in natural systems; the hydrologic cycle; physical properties of aquifers and subsurface flow; open channel flow; aqueous geochemistry. {Also offered for undergraduate credit - see GEOL 414.}.

GEOL 620. Mineralogy. 3 Credits.

Crystal forms, crystal chemistry, and formation of non-silicate and silicate minerals. (alternate years) {Also offered for undergraduate credit - see GEOL 420.}.

GEOL 621. Mineralogy Laboratory. 1 Credit.

Identification and classification of minerals using morphology, physical properties, XRF and XRD. Coreq: GEOL 620. (alternate years) {Also offered for undergraduate credit - see GEOL 421.}.

GEOL 622. Petrology. 3 Credits.

Principles of igneous and metamorphic petrology including geochemistry, phase relations, and rock forming processes. Prereq: GEOL 620. (alternate years) {Also offered for undergraduate credit - see GEOL 422.}.

GEOL 623. Petrography. 1 Credit.

Identification and classification of rocks in hand specimens and thin sections. Optical mineralogy. Field and laboratory projects required. Prereq: GEOL 622. (alternate years) {Also offered for undergraduate credit - see GEOL 423.}.

GEOL 628. Geochemistry. 3 Credits.

Introduction to geochemistry: chemistry of the Earth, groundwater, isotopes, global geochemical cycles, geochemical modeling, and environmental geochemistry. Cross-listed with CHEM 628. (alternate years) {Also offered for undergraduate credit - see GEOL 428.}.

GEOL 650. Field Geology. 3 Credits.

Interpretation of geology in the field; preparation of base maps and plotting geological data. Lectures and one-week fieldwork. Fee required. Prereq: GEOL 610, GEOL 621, GEOL 623, GEOL 657. (alternate years) {Also offered for undergraduate credit - see GEOL 450.}.

GEOL 657. Structural Geology. 4 Credits.

Dynamics of rock deformation and analyses of Earth structure. (alternate years) {Also offered for undergraduate credit - see GEOL 457.}.

GEOL 660. Biogeochemistry. 3 Credits.

An overview of how life affects Earth's chemistry, examining interactions between the atmosphere, the land surface, and the oceans. Biotic mechanisms will be followed via the global cycles of biologically relevant elements stressing human impacts. {Also offered for undergraduate credit - see GEOL 460.}.

GEOL 665. Remote Sensing of the Environment. 3 Credits.

This course will focus on developing practical skills for using various types of accessible remote sensing technologies as applied to environmental sciences. We will learn to work with aerial photographs, aerial lidar data, Terrestrial Laser Scanning (TLS), structure from motion (sfm), and Unmanned Aerial Vehicles (UAVs). We will explore the drawbacks and benefits of each technology and how it can be used to gather information and measure change in the environment. Cross-listed with GEOG. {Also offered for undergraduate credit - See GEOL 465.}.

GEOL 680. Geographic Information Systems Pattern Analysis and Modeling. 3 Credits.

Application of GIS for determination of: factors or variables that influence geospatial patterns, data limitations in spatial and temporal continuum scales, identification of data anomalies, optimal data prediction, and evaluation of prediction uncertainty. Prereq: GEOG 655. Cross-listed with GEOG 680. {Also offered for undergraduate credit - see GEOL 480.}.

GEOL 695. Field Experience. 1-15 Credits.

GEOL 696. Special Topics. 1-5 Credits.

GEOL 712. Topics in Geomorphology. 3 Credits.

This course focuses on developing an understanding of how Earth surface processes shape the landscape and how these processes relate to research in a broad range of disciplines.

GEOL 760. Advanced Biogeochemistry. 3 Credits.

Examines the nature of the interaction between Earth's biogeochemical cycles and climate and how this interaction has evolved over time and will change in the future. Recommended: GEOL 660.

GEOL 793. Individual Study/Tutorial. 1-5 Credits.

German (GERM)

GERM 101. First-Year German I. 4 Credits.

Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of German required.

GERM 102. First-Year German II. 4 Credits.

Basic structures and vocabulary of German. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: GERM 101.

GERM 194. Individual Study. 1-5 Credits.

GERM 196. Field Experience. 1-15 Credits.

GERM 199. Special Topics. 1-5 Credits.

GERM 201. Second-Year German I. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 102.

GERM 202. Second-Year German II. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary reading. Prereq: GERM 201.

GERM 220. German Culture & Society. 3 Credits.

Exploration of German culture (including everyday culture, film, and literature), politics, history, geography, and religion. A broad overview with particular emphasis on Germany since 1945. Taught in English.

GERM 291. Seminar. 1-3 Credits.

GERM 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 294. Individual Study. 1-5 Credits.

GERM 299. Special Topics. 1-5 Credits.

GERM 311. German Conversation and Composition I. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: GERM 202.

GERM 312. German Conversation and Composition II. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: GERM 311 or equivalent.

GERM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

GERM 391. Seminar. 1-3 Credits.

GERM 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 394. Individual Study. 1-5 Credits.

GERM 399. Special Topics. 1-5 Credits.

GERM 491. Seminar. 1-5 Credits.

GERM 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

GERM 494. Individual Study. 1-5 Credits.

GERM 496. Field Experience. 1-15 Credits.

GERM 499. Special Topics. 1-5 Credits.

Health, Nutrition & Exercise Sciences (HNES)

HNES 100. Concepts of Fitness & Wellness. 2 Credits.

Facts about exercise and physical fitness.

HNES 110. Introduction to Health and Physical Education. 3 Credits.

This course will acquaint students with historical insights and current trends in the fields of health and physical education. Students will also identify various career opportunities within their field of study and acquaint themselves with the professional field.

HNES 111. Wellness. 3 Credits.

Examination of personal lifestyle choices related to emotional, nutritional, and mental well-being.

HNES 112. Activity II. 1 Credit.

Basic techniques and practice of individual and dual sports activities. May be repeated in different activities/subjects only.

HNES 114. Racquetball. 1 Credit.

Basic techniques and practice of racquetball.

HNES 115. Bowling. 1 Credit.

Basic techniques and practice of bowling.

HNES 116. Billiards. 1 Credit.

Basic technique and practice of billiards.

HNES 117. Judo. 1 Credit.

Basic techniques and practice of judo.

HNES 126. Social Dance. 1 Credit.

Basic techniques and practice of social and ballroom dance forms such as foxtrot, waltz, jitterbug, polka, schottische, and Latin American dances.

HNES 128. Golf. 1 Credit.

Basic technique and practice of golf.

HNES 130. Rock Climbing. 1 Credit.

Basic technique and practice of rock climbing.

HNES 133. Volleyball. 1 Credit.

In this course you will learn the basic principles, rules and practice of volleyball.

HNES 134. Basketball. 1 Credit.

Basic technique and practice of basketball.

HNES 135. Badminton. 1 Credit.

Basic technique and practice of badminton.

HNES 139. Dodgeball. 1 Credit.

Basic technique and practice of dodgeball.

HNES 148. Team Sports. 1 Credit.

Basic principles, rules, and practices of various team sports.

HNES 167. Esports. 1 Credit.

This course is designed to teach you to play different types of Esport games. It will acquaint you with the rules of these games as well as teach game and socialization etiquette. Students will compete in class against classmates, as well as people all over the world. As new games come out, they will be added and as games are no longer played, they will be removed.

HNES 170. Introduction to Exercise Science. 2 Credits.

Investigation of various Exercise Science career opportunities within the field and the professional track at NDSU.

HNES 190. Introduction to Sport Management. 3 Credits.

This course is designed to introduce students to various concepts that make up the foundation and underlying principles of sport management. In addition, program expectations are covered and a focus is placed on professional development.

HNES 194. Individual Study. 1-5 Credits.

HNES 196. Field Experience. 1-15 Credits.

HNES 199. Special Topics. 1-5 Credits.

HNES 211. Successful Coaching. 1 Credit.

This course is designed to help potential coaches develop a successful coaching philosophy. Students will complete an examination through the American Sport Education Program that will certify them to coach in 35 states.

HNES 217. Personal and Community Health. 3 Credits.

Study of vital personal and community health issues. Particular attention to current health facts, habits, and attitudes as they relate to home, school, and community.

HNES 226. Socio-Cultural Dimension in Sport. 3 Credits.

Students will gain a level of understanding of how sport has and does contribute to the notion of nation building in North America and across the world. Prereq: HNES 190 and Sport Management professional program students only.

HNES 231. Officiating Football. 1 Credit.

Rules and techniques of officiating football.

HNES 232. Officiating Basketball. 1 Credit.

Rules and techniques of officiating basketball.

HNES 250. Nutrition Science. 3 Credits.

Scientific principles of nutrition based on chemical structure and function of the nutrients. 3 lectures.

HNES 251. Nutrition, Growth and Development. 3 Credits.

Examination of growth and nutrient needs through the lifecycle. Prereq: HNES 200 or HNES 250.

HNES 254. Curriculum, Standards and Assessment in Physical Education. 3 Credits.

This course bridges the gap between theory and practice by providing a practical approach to curriculum writing, standards development and assessment techniques used in K-12 physical education programs. Prereq: HNES 110. Co-req: HNES 256.

HNES 255. Professional Preparation in Middle School Physical Education. 3 Credits.

Instruction of various fundamental movement for middle school students. Students will be exposed to such activities as team sports, intermediate movement skills, and games. Prereq: Students must be Physical Education majors.

HNES 256. Professional Preparation in High School Physical Education. 3 Credits.

Instruction in the fundamentals of teaching high school physical education activities. Prereq: HNES 110. Co-req: HNES 254.

HNES 257. Professional Preparation in Elementary School Activities. 3 Credits.

Instruction of various fundamental movements for elementary aged students. Students will be exposed to such activities as dance, gymnastics, fundamental movement skills, and games. Prereq: HNES 254.

HNES 260. Athletic Training Medical Terminology. 1 Credit.

Medical terminology related to athletic training and other allied health professions.

HNES 261. Food Selection and Preparation Principles. 3 Credits.

Scientific principles underlying food selection, preparation, and preservation; integration of nutrition principles, food standards, cost comparisons, and new food developments. 3 lectures. Prereq: HNES 141 and CHEM 117 or CHEM 121.

HNES 261L. Food Selection and Preparation Principles Laboratory. 2 Credits.

Illustrates and extends lecture topics and stresses practical application of scientific food preparation principles. Co-req: HNES 261.

HNES 274. Introduction to Youth and Interscholastic Sport. 3 Credits.

The course will allow students to gain an understanding of issues, administration and organization of youth and interscholastic sport. Requirements to be completed will encourage students to think about the current events or issues and explain the effect each may have on the industry in the present and future of youth and interscholastic sport. Prereq: HNES 190. Co-req: HNES 226.

HNES 276. Professional Observation. 1 Credit.

Observation in a setting providing established health-fitness services. Prereq: HNES 170 and HNES 272.

HNES 291. Seminar. 1-5 Credits.

HNES 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 294. Individual Study. 1-3 Credits.**HNES 299. Special Topics. 1-5 Credits.****HNES 301. Motor Learning and Performance. 3 Credits.**

Study of the principles of motor learning and development and how those principles apply in physical education and sport skill development. Prereq: acceptance into the Physical Education program.

HNES 304. Sport Promotion and Public Relations. 3 Credits.

This course explores the aspects of the sports promotion industry and how industry interfaces with the consumer. Theories of sport promotion and public relations will be related to promotion efficacy. Prereq: HNES 190, HNES 224 and students must be admitted to the Sport Management professional program.

HNES 324. Sport and Event Management. 3 Credits.

The course is designed to provide participants with fundamental theoretical and practical knowledge in sport event principles and techniques, and issues confronting professionals in sport organizations. Through knowledge dissemination (lectures), class participation (discussions and presentations), and professional inquiry (strategic event planning and research), students will gain a further understanding of sport and event management. Prereq: HNES 190, HNES 226 and HNES 304.

HNES 336. Methods Of Coaching. 3 Credits.

Provides information necessary to coach at any level from elementary to college. Includes broad overview of the philosophy, methodology, and management of sport. Prereq: acceptance into the Health Education or Physical Education program.

HNES 341. Psychosocial Aspects of Health. 3 Credits.

Study of the interaction of the person and his/her environment. Discussion of emotional states, physiological responses and behaviors influencing a person's health, and the health of those around them. Prereq: PSYC 111, HNES 110 and HNES 217 and students must be professional level 2 Health Ed majors.

HNES 345. Materials and Concepts of Health Education. 3 Credits.

Development and dissemination of health content helping community and school health educators place health instruction in a perspective that relates it to efforts aimed at protecting and promoting the health of children, youth and adults. Prereq: HNES 217 and Health Education majors only.

HNES 349. Advanced Coaching. 3 Credits.

Provides advanced coaching information including practice and season planning, talent analysis and development, scouting, game preparation, and game execution. Prereq: HNES 336.

HNES 350. Fitness Education Activities and Materials. 3 Credits.

Topics related to teaching concepts-based fitness in high school physical education. Prereq: HNES 367.

HNES 351. Metabolic Basis of Nutrition. 4 Credits.

Biochemical and physiological principles of human nutrition. Nutrients in relation to metabolic regulation. 4 lectures. Prereq: HNES 250, BIOC 260 or BIOC 460 and Dietetics professional standing.

HNES 353. Adapted Physical Education. 3 Credits.

Current concepts and trends in adapted physical education, including the planning and implementation of adapted physical education curriculum and lessons designed to meet the needs of individuals with disabilities. Prereq: HNES 367.

HNES 354L. Introduction to Medical Nutrition Therapy Laboratory. 2 Credits.

Supervised practice in dietetics, for Coordinated Program Dietetics students, in a health care setting. 1 three-hour laboratory. Prereq: HNES 251, HNES 351. Coreq: HNES 354.

HNES 354. Introduction to Medical Nutrition Therapy. 4 Credits.

Introduction to the role and skills in nutritional care and application of skills necessary for beginning competency as a clinical dietitian. Prereq: HNES 251, HNES 351 and Dietetics professional standing.

HNES 361. Foodservice Systems Management I. 3 Credits.

Principles and methods of purchasing, production, and management for quantity foodservice operations. 3 lectures. Prereq: HNES 261, HNES 261L.

HNES 361L. Foodservice Systems Management I Laboratory. 3 Credits.

Menu and special event planning, food production, recipe analysis, and safety & sanitation for student-led "made-from-scratch" lab experience. Coreq: HNES 361.

HNES 365. Kinesiology. 3 Credits.

Study of movement analysis with emphasis on anatomical and movement principles. Prereq: BIOL 220, BIOL 220L. Restricted to Exercise Science majors only.

HNES 367. Principles of Conditioning. 3 Credits.

Scientific theory and application of principles and techniques of physical conditioning to optimize training programs. Introduction of a wide variety of sports activities and associated training protocols. Prereq: acceptance into the Health Education or Physical Education program.

HNES 368. Biomechanics of Exercise. 3 Credits.

Study of the application of the principles of biomechanics and physics to human movement. Prereq: HNES 365. Restricted to Exercise Science professional majors only.

HNES 370. Exercise and Disease. 3 Credits.

Focus on the role physical activity or inactivity plays in the development, inhibition, and/or treatment of common chronic and metabolic conditions. Prereq: BIOL 221, BIOL 221L and HNES 375. Co-Req: HNES 465.

HNES 371. Worksite Health Promotion. 3 Credits.

Design and implementation of worksite health promotion programs and the benefits for employees and employers. Prereq: HNES 375 and Exercise Science professional majors only.

HNES 374. Methods in Resistance Training and Cardiovascular Conditioning. 3 Credits.

This course is designed to provide the student knowledge in the techniques of resistance training, cardiovascular conditioning, and program design. Prereq: HNES 365. Restricted to Exercise Science professional students only.

HNES 375. Research Methods and Design in Exercise Science. 3 Credits.

Understanding and application of a wide variety of research design principles and methodology in exercise science. Prereq: STAT 330 and Exercise Science professional majors only.

HNES 376. Adapted Physical Activity. 3 Credits.

Current concepts and trends in adapted physical activity, including the planning and implementation of physical activity programs and sports designed to meet the needs of individuals with disabilities. Prereq: Exercise Science professional status.

HNES 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HNES 388. Prevention and Care of Athletic Injuries. 3 Credits.

This course is designed to introduce the student to basic care, treatment, and prevention of athletic related injuries. Other sports medicine concepts will also be discussed.

HNES 391. Seminar. 1-3 Credits.**HNES 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 394. Individual Study. 1-5 Credits.**HNES 399. Special Topics. 1-5 Credits.****HNES 400. Interprofessional Health Care Practice. 3 Credits.**

This course is designed for pharmacy, nursing, allied sciences, and other allied health students focusing on the necessary knowledge, skills, and attitudes to function as an effective member of the health care team. Prereq: HNES 354. Cross-listed with CHP.

HNES 425. Practical Sport Marketing Research. 3 Credits.

This course introduces students to research topics unique to sport and leisure marketing. This course will examine research relating to sport motivation for participants and spectators, connection to sport objects, sport consumer behavior, sport team identification, sport event attendance, sport analytics, sport finance, daily fantasy sport, eSports, sport economics, and the sociology of sport, among other topics. Students will be introduced to multiple ways of understanding research in sport and learning how to apply learned concepts and findings efficiently within the industry. Prereq: HNES 190, HNES 224, HNES 226 and restricted to Sport Management students only.

HNES 426. Sport Administration. 3 Credits.

This course is intended to familiarize sport management majors with common administrative practices in sport. Prereq: HNES 190, HNES 224, HNES 226, HNES 304, HNES 431, HNES 436, junior standing and Sport Management professional program students only.

HNES 431. Governance, Policy, Legal Liability and Ethics in Sport. 3 Credits.

This course examines how sport organizations interact and coordinate with numerous policy actors from inside and outside the sport realm to facilitate and coordinate the mechanisms of governance. Prereq: HNES 190, HNES 224 and students must be admitted to the Sport Management professional program.

HNES 436. Managing Sport Facilities. 3 Credits.

This class will cover numerous issues from construction-related concerns to marketing facilities, naming rights, and concession concerns. Also covered will be topics related to the facility management side of the industry, with special attention paid to back-of-the-house operations such as water, heating, cooling, and related activities. This is a comprehensive course focusing on applied rather than theoretical knowledge. Prereq: HNES 190, HNES 224, HNES 226, HNES 304 and students must be admitted to the Sport Management professional program.

HNES 442L. Community Health and Nutrition Laboratory. 3 Credits.

Application of nutrition education and program development in community settings. Coreq: HNES 442. {Also offered for graduate credit - see HNES 642L.}

HNES 442. Community Health and Nutrition Education. 3 Credits.

Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. Prereq: HNES 251. {Also offered for graduate credit - see HNES 642.}.

HNES 445. Organization and Administration of Coordinated School Health Programs. 3 Credits.

Examination of coordinated school health programs (CSHP). Analysis of the components of and approaches to development of CSHP. Emphasis on skills required for entry-level health educators. Prereq: HNES 345, senior standing. (Also available for graduate credit - See HNES 645.).

HNES 458. Advanced Medical Nutrition Therapy. 4 Credits.

Principles in the nutrition care of patients with conditions requiring nutrition care. 4 lectures. Prereq: HNES 354 and Dietetics professional standing. (Also offered for graduate credit - see HNES 658.).

HNES 458L. Advanced Medical Nutrition Therapy Laboratory. 3 Credits.

Supervised practice for CP students in nutrition care to accompany HNES 458. 1 eight-hour laboratory. Coreq: HNES 458.

HNES 460. Leadership and Communication in Dietetics. 1 Credit.

This course focuses on leadership, team-building, and professional communication in Dietetics. Leadership and communication theories will be applied to everyday practices to prepare participants to be successful leaders in the workforce. (Also offered for graduate credit - see HNES 660.).

HNES 460L. Foodservice Systems Management II Laboratory. 1 Credit.

Supervised practice for CP students in foodservice to accompany HNES 460. 1 four-hour laboratory. Coreq: HNES 460.

HNES 461. Administrative and Social Aspects of Physical Education and Athletics. 3 Credits.

Study of administrative principles and social aspects that influence the development of physical education and athletic programs. Prereq: HNES 350.

HNES 465. Physiology Of Exercise. 3 Credits.

Effects of exercise on the physiology of the human body. Includes aerobic systems, strength/muscle adaptations, body composition, training programs, and other areas related to training. Prereq: BIOL 221, BIOL 221L and HNES 365, HNES 366. Restricted to Exercise Science professional majors only.

HNES 466. Physiology Exercise Laboratory. 1 Credit.

Laboratory exercises to test aerobic and anaerobic capacity, strength, body composition, dietary analysis. Coreq: HNES 465. Restricted to Exercise Science, Human Performance & Fitness or Athletic Training professional majors only.

HNES 467. EKG Monitoring. 3 Credits.

Introduction of the student to the monitoring and interpretation of an electrocardiogram. Prereq: HNES 465, HNES 466 and Exercise Science professional majors only.

HNES 472. Exercise Assessment and Prescription. 3 Credits.

Physiological testing procedures applicable to physical activity and fitness settings, with application to exercise prescription. Prereq: HNES 370, 465 and 466 and Exercise Science professional majors only. Co-req: HNES 476.

HNES 473. Anaerobic Exercise Prescription and Advanced Resistance Training Techniques. 3 Credits.

Designing resistance training programs for various sports and activities, with hands on experience leading people through advanced resistance training exercises. Prereq: HNES 368.

HNES 475. Exercise Science Internship. 12 Credits.

Capstone course for human performance and fitness majors. Supervised field work in a professional setting with emphasis on administration, supervision, and program leadership.

HNES 476. Exercise Testing Laboratory. 2 Credits.

The student will learn different physiological testing procedures applicable to physical activity and fitness settings. Prereq: HNES 465, HNES 466 and Exercise Science professional majors only. Co-req: HNES 472.

HNES 480. Dietetics Practicum (Capstone Experience). 12 Credits.

Practical experience for students in the Coordinated Program in Dietetics with the responsibility equal to that of an entry-level dietitian. 40 hours laboratory per week in a clinical facility. Prereq: HNES 458L and HNES 460L.

HNES 481. Dietetics: Capstone Course for DPD. 1 Credit.

Capstone for Dietetics majors in the Didactic program in Dietetics.

HNES 485. Sport Management Internship. 1-12 Credits.

This course provides comprehensive learning experiences for students majoring in Sport Management. It includes 43 hours per credit of on-site work experience with approved organizations and may be repeated for a total of 12 credits. Prereq: HNES 190, HNES 224, HNES 226 and students must be admitted to the Sport Management professional program.

HNES 491. Seminar. 1-5 Credits.**HNES 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HNES 493. Undergraduate Research. 1-5 Credits.

HNES 494. Individual Study. 1-5 Credits.

HNES 496. Field Experience. 1-15 Credits.

HNES 499. Special Topics. 1-5 Credits.

HNES 642. Community Health and Nutrition Education. 3 Credits.

Nutrition education in community settings. Topics include behavior change, education and counseling theory, needs assessment, planning, implementation, and evaluation in a community setting. {Also offered for undergraduate credit - see HNES 442.}.

HNES 642L. Community Health and Nutrition Laboratory. 3 Credits.

Application of nutrition education and program development in community settings. Coreq: HNES 642. {Also offered for undergraduate credit - see HNES 442L.}.

HNES 645. Organization and Administration of Coordinated School Health Programs. 3 Credits.

Examination of coordinated school health programs (CSHP). Analysis of the components of and approaches to development of CSHP. Emphasis on skills required for entry-level health educators. {Also offered for undergraduate credit - See HNES 445.}.

HNES 652. Nutrition, Health and Aging. 3 Credits.

Physiological changes with aging and their relationship to food habits and nutritional need. Common nutritional health problems with emphasis on prevention and treatment. 3 lectures.

HNES 655. Sports Nutrition. 3 Credits.

Provides both current research and the translation of research findings into practical advice, offering unique insights on how nutrition can be used to design and effectively implement the optimal diet for performance. {Also offered for undergraduate credit - see HNES 455.}.

HNES 658. Advanced Medical Nutrition Therapy. 3-4 Credits.

Principles in the nutrition care of patients with conditions requiring nutrition care. 3-4 lectures. Prereq: HNES 354. Restrictions: Section 1: Non-GPIDEA, Dietetics Professional Standing Section 2 and 3: Registered Dietitian (RD) or be RD₂ eligible, In GPIDEA Dietetics Program {Also offered for undergraduate credit - see HNES 458.}.

HNES 660. Leadership and Communication in Dietetics. 1 Credit.

This course focuses on leadership, team-building, and professional communication in Dietetics. Leadership and communication theories will be applied to everyday practices to prepare participants to be successful leaders in the workforce. {Also offered for undergraduate credit - see HNES 460.}.

HNES 690. Graduate Seminar. 1-3 Credits.

HNES 696. Special Topics. 1-5 Credits.

HNES 700. Research in Physical Education and Sport. 3 Credits.

This course is designed to help teachers and coaches in the field better understand the process of conducting classroom/sport setting research through practitioner inquiry.

HNES 701. Leadership and Supervision. 3 Credits.

This course provides an introduction to leadership and supervision in physical education and sport settings. The course is designed to provide students with skills, techniques, and practices for successful leadership and supervision. Prereq: Must be accepted into the MS option of Leadership in Physical Education and Sports.

HNES 702. Introduction to Advanced AT and Professionalism. 1 Credit.

This course will include discussion of the expectations and responsibilities of the post-professional athletic trainer's transition into graduate school and as a professional healthcare provider. The content will be focused on information and tools to adjust to the new roles and responsibilities.

HNES 703. Graduate Biomechanics of Sport and Exercise. 3 Credits.

This course is designed to increase the knowledge and students understanding of the biomechanical principles behind training, sport, and physical activity.

HNES 704. Psychological Foundation of Sport & Physical Activity. 3 Credits.

Comprehensive description of sport psychology, application of concepts to sport performance improvements as well as other areas in physical activity.

HNES 705. Analysis of Sport Skill Instruction and Acquisition. 3 Credits.

This course is designed to discuss theories of instruction in physical education and sport and the principles of motor learning. It includes the analysis of the learning process in relation to motor development and the role of the teacher and/or coach.

HNES 707. Sport in American Society. 3 Credits.

This course provides students with a better understanding of the relationship of sport to American culture and society. Course materials focus on the application of the sociological perspective to a variety of topics.

HNES 708. Positive Youth Development through Sport. 3 Credits.

This course is intended to increase student awareness and understanding of important issues and concerns in contemporary youth sport. Restrictions: Restricted to LPES graduate students.

HNES 709. Leadership Influence in Physical Education and Sport. 3 Credits.

This course is intended to increase student awareness and understanding of contemporary issues related to leadership in physical education sport.

Prereq: restricted to LPES graduate students.

HNES 710. Introduction to Research Design and Methods in HNES. 3 Credits.

This course is intended to prepare students to conduct research by discussing basic research designs and methods. Students will begin to develop topics, write research questions and identify appropriate methods to answer the questions for a thesis or research project. During this course students will write section(s) of their proposals or chapters and receive feedback. This course also reviews grant writing.

HNES 711. Physical Education Curriculum. 3 Credits.

To provide an understanding of the role and importance of physical education in today's society, steps involved in curriculum planning, trends and issues in physical education curriculum and to orient students to various ideas in physical education curriculum design.

HNES 712. Principles of Management. 3 Credits.

This course is designed to study the principles of management for the improvement of various phases of the learning process of teaching, coaching, and leadership. Students will develop a comprehensive foundation on the fundamentals of management. Prereq: Must be accepted into the MS option of Leadership in Physical Education and Sport.

HNES 713. Graduate Exercise Physiology. 3 Credits.

Comprehensive state-of-the-art review of the current knowledge of the physiological responses to exercise.

HNES 714. Legal Liability in HPER. 3 Credits.

Focused on risk management and legal liability in health, physical education, and recreation. Overview of civil and criminal law related to sports and recreation.

HNES 715. Teaching Concepts-Based Fitness. 3 Credits.

This course will cover topics directly related to the teaching of concepts-based health-related fitness in K-12 physical education. The overall aim is to help students have a better theoretical and practical understanding of the role of fitness education in contemporary physical education. The main goal of this course is to prepare students so that they can teach concepts-based health-related components to students in a public school setting.

HNES 716. Financial Management in Sport. 3 Credits.

This course discusses financial strategies related to sport entities and recreation and leisure-based organizations. This course will examine business structures, sources of capital, and theories of financial management in the sport enterprise and recreation industry. A large portion of this class is the creation of a comprehensive report in which the student critically examines and analyzes the financial feasibility of a local sport or recreational endeavor. Prereq: Eligible students are those enrolled in the Leadership in Physical Education and Sport Master Program at NDSU.

HNES 719. Public Health Nutrition. 3 Credits.

This course provides information and activities related to the broad topic of public health nutrition and will focus on how nutrition research, policies and programs impact populations. Students will gain a broader understanding of public health nutrition through case studies, discussions and experiential learning experiences.

HNES 720. Advanced Emergency Care. 3 Credits.

This course will introduce advanced emergency care techniques as well as reinforce basic knowledge already learned in previous course work. Certified Athletic Trainers are expected to perform life-saving measures and this course will develop the skills needed to treat athletes and lay public with evidence based medical care.

HNES 722. Evidence Based Orthopedic Evaluation. 3 Credits.

This course will involve investigation, discussion, and reflection of the research on clinical orthopedic special tests to allow the student to implement evidence based clinical examinations.

HNES 723. Advanced Techniques in Sports Medicine. 3 Credits.

This course will review current research in the latest and most advanced techniques in sports medicine.

HNES 724. Nutrition Education. 3 Credits.

Principles and practices of teaching individuals and groups to translate nutrition knowledge into action. Emphasis on research in evaluation of nutrition education.

HNES 726. Nutrition in Wellness. 3 Credits.

Course will address wellness promotion through nutrition. Nutritional risk and protective factors will be examined as they relate to public health and individual nutrition.

HNES 727. Physical Activity Epidemiology. 3 Credits.

Review of the evidence on the associations between physical activity and chronic diseases, and effects of physical activity on health. Understanding and discussion regarding how the methods of epidemiology are being used to scientifically confirm that physical inactivity is a burden on public health and what can be done about it.

HNES 728. Current Issues in Dietetics. 3 Credits.

Environmental scanning of trends in dietetics, with the impact of changes in global, economic, social, ethical, political, legal, technological, and ecological areas on healthcare and on dietetics practice.

HNES 729. Grant Writing for the Health Professional. 3 Credits.

Steps needed for successful grant applications. Identification of funding sources and completion of the application form. Designed for Registered Dietitians.

HNES 730. Fundamentals of Leadership. 3 Credits.

An appreciation of the basic principles of leadership by gaining an insight into one's own leadership abilities and developing the practical skills necessary to function as a leader in a realistic context.

HNES 731. Governance in Sport. 3 Credits.

This course examines how sport organizations interact and coordinate with numerous policy actors from inside and outside the sport realm to facilitate and coordinate the mechanisms of governance.

HNES 732. Foodservice Operation Management. 3 Credits.

In-depth analysis of several critical foodservice operations management decisions and development of analytical skills needed in solving operation management problems encountered in the foodservice industry.

HNES 733. Food Writing for Professionals. 3 Credits.

This course focuses on the writing skills needed by the food professional in order to communicate effectively in writing about food and food-related topics.

HNES 734. Foodservice Systems within Healthcare. 3 Credits.

A comprehensive review of today's health care institutions and their response to the economic, social/ethical, political/legal, technological, and ecological environments. Prereq: must be enrolled in the GPIDEA HNES: Option in Dietetics.

HNES 735. Nutrition and Human Performance. 3 Credits.

This course is designed for students to develop an understanding of nutrition based upon knowledge of the biochemical and physiological process and functions of specific nutrients in meeting nutritional requirements. The course emphasizes the relationship of optimal nutrition and physical efficiency and performance.

HNES 736. Ethical Leadership. 3 Credits.

This course looks at the various ethical situations coaches encounter within organizations and with other coaches and athletes. Students will gain an understanding of the ethical dimensions of sport and develop strategies to facilitate ethical coaching practices and encourage athletes to recognize and understand the importance of ethics in sport. Prereq: restricted to LPES graduate students only.

HNES 737. School-wide Physical Activity Promotion. 3 Credits.

Assessment, planning, and evaluation of physical activity programming within the K-12 setting. Understanding and implementation of school-wide physical activity program models and resources. Physical activity advocacy and stakeholder engagement strategies within K-12 physical activity programs. Prereq: Must be accepted into the HNES MS Leadership in Physical Education and Sport option.

HNES 738. Adapted Physical Education. 3 Credits.

This course provides an overview of the etiological, physical, and psychological considerations of disabilities in education settings. This course contains methods of adapting activities in physical education for individuals with disabilities. This course is delivered online via BlackBoard.

HNES 739. Sport Revenue Generation. 3 Credits.

This course is designed to examine means of maximizing revenue streams in and around the sport industry. As sport is a unique sector of the entertainment industry, managers are best suited to understand how to get the most out of the limited resources and partnership opportunities they have access to. This course will allow each student to focus on the sport context of their interest (e.g., youth sport, interscholastic sport, and collegiate athletics) in an effort to build a greater knowledge base on how to succeed and produce needed revenue streams in today's fast-paced and ever-changing sport environment. Major topics include the sport consumer, sport sponsorship, and the class will focus on researching and acquiring sponsors for a hypothetical event as decided by each student.

HNES 740. Maternal and Child Nutrition. 3 Credits.

Behavioral, physiological and public health issues impacting dietary and nutritional factors that support normal growth and development. Focuses on the early stages of the life cycle: gestation, lactation, infancy, preschool, school age and adolescence.

HNES 741. International Nutrition. 3 Credits.

Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in developing societies. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status.

HNES 742. Nutrition: A Focus on Life Stages. 3 Credits.

The influence of normal physiological stresses on nutritional needs throughout the life span will be explored. Evaluating nutritional status at different stages of life and identifying appropriate needs and services will be included.

HNES 743. Obesity Across the Lifespan. 3 Credits.

This course emphasizes obesity in a population from childhood to the adult with attention to the impact of obese conditions on disease development throughout the life cycle.

HNES 744. Dietary and Herbal Supplements. 3 Credits.

Explore the safety and efficacy of botanical/herbal and dietary supplements in health applications including dietary supplementation in the prevention and treatment of chronic illness.

HNES 746. Nutrition and Health Disparities. 3 Credits.

This course is an examination of nutrition and health disparities in the U.S. Identification of sociocultural determinants of health and their influence on nutrition and health outcomes. Exploration of interdisciplinary strategies to reduce nutrition and health disparities.

HNES 747. Understanding Food Culture. 3 Credits.

This course is designed as a survey of topics that affect how we perceive food in the modern world. Food is examined as a badge of cultural identity, a focus of media scrutiny and promotion, a symbol of religion, and a driver of technology.

HNES 748. Nutritional Epidemiology. 3 Credits.

Methods and issues involved in understand and conducting studies on the relationship between human diet and disease. Recommended: graduate level statistics course.

HNES 750. Advanced Human Nutrition: Macronutrients. 3 Credits.

Physiological and biochemical aspects of macronutrients of human nutrition.

HNES 751. Metabolism of Micronutrients. 3 Credits.

This course focuses on nutrition that integrates mechanisms and interactions of vitamins and minerals from the cellular level, through the integration and regulation of metabolism in the whole organism.

HNES 752. Phytochemicals. 3 Credits.

Overview of phytochemicals (non-nutritive biologically active compounds) from fruits, vegetables, cereals and oilseeds with implications related to chemistry, physiological functions, and potential health implications.

HNES 753. Nutrigenomics and Advanced Lipid Metabolism in Human Nutrition. 3 Credits.

Concepts of how nutrients regulate gene expression (nutrigenomics) and how an individual's genotype influences their nutrient requirements (nutrigenetics). This course will focus on the unique role of lipids in nutritional genomics and chronic disease. Students must be enrolled in the M.S. in Dietetics program (GPIDEA).

HNES 754. Assessment in Nutrition and Exercise Science. 3 Credits.

Techniques to assess nutritional status, physical fitness status and how to interpret the information received.

HNES 756. Pediatric Clinical Nutrition. 3 Credits.

The physiological, biochemical and nutritional aspects of disease processes relevant to infants and children up to 18 years of age, including inborn errors of metabolism, food hypersensitivity, obesity, and diseases of the major organ systems. Prereq: HNES 755.

HNES 757. Nutritional Aspects of Oncology. 3 Credits.

Basic cancer biology and the relationship between nutrition and cancer, the role of nutrition in specific cancers, and information for cancer prevention programs and how to apply this information in patient management.

HNES 758. Clinical Aspects of Nutrition Support. 3 Credits.

Specialized nutrition assessment and support. Review of energy expenditure and substrate utilization in disease states. Methods for the initiation and management of enteral and parenteral nutrition therapy. Evaluation of nutrition support selected disease states.

HNES 759. Nutrition and Immunology. 3 Credits.

Principles and issues related to nutrition and immunology. Impact of nutrients and nutritional status on immune responses. Impact of disease states on nutritional status.

HNES 760. Skeletal Muscle Physiology. 3 Credits.

This course is designed to provide students with an in-depth analysis of the structure and function of skeletal muscle. Course material ranges from skeletal muscle microanatomy and physiology to advanced topics in neuromuscular physiology.

HNES 761. Physiological and Fitness Assessment in Exercise Science. 3 Credits.

Instruction and practical guidelines of different physiological and fitness assessments in exercise science.

HNES 762. Exercise Endocrinology. 3 Credits.

A comprehensive review of the endocrine system with a specific emphasis on the hormonal response to exercise. Prereq: MS or PhD level students only.

HNES 765. Orthopedic Appliances. 3 Credits.

Application of common casting and bracing techniques.

HNES 770. Evidence Based Research and Practice. 2 Credits.

This course introduces students to current evidence based research methods and the importance of conducting and interpreting athletic training research. Prereq: HNES 780.

HNES 772. Prevention and Health Promotion in Athletic Training. 2 Credits.

General nutrition, prevention and health promotion concepts, and psychosocial and mental health aspects in athletic training. Prereq: HNES 770.

HNES 773. Athletic Training Capstone. 2 Credits.

Comprehensive review of patient case scenarios using evidence-based practice for clinical integration as a healthcare professional. Prereq: HNES 774, HNES 776.

HNES 774. Therapeutic Exercise. 3 Credits.

Therapeutic interventions involving rehabilitative techniques, equipment, and activities using body movements to enhance function, prevent impairments and activity restrictions to maximize participation and health-related quality of life.. Prereq: HNES 782.

HNES 775. Therapeutic Modalities. 3 Credits.

Therapeutic interventions involving contemporary modalities to prevent and treat orthopedic injuries to restore and enhance function and maximize participation and health-related quality of life. Prereq: HNES 770.

HNES 776. Non-Orthopedic Assessment. 2 Credits.

Clinical evaluation and diagnosis of non orthopedic conditions and illnesses. Prereq: HNES 782.

HNES 777. Scholarly Writing and Presenting in HNES. 3 Credits.

This course is designed for students pursuing their Master or Doctorate degree who are currently writing a proposal or a chapter of their thesis or dissertation. Class sessions cover the conventions for each chapter of the thesis/dissertation, analytical reading of research articles in the areas of HNES, and effective methods of presenting research.

HNES 778. Athletic Training Administration and Professional Development. 3 Credits.

Understand the health care system and professional competence as related to athletic training. Prereq: HNES 776.

HNES 780. Athletic Training Techniques. 3 Credits.

Exposure to a variety of fundamental athletic training skills and techniques. Prereq: Admission to the Master of Athletic Training program.

HNES 781. Orthopedic Assessment I. 4 Credits.

Clinical evaluation and diagnosis of the lower extremity. Prereq: HNES 780.

HNES 782. Orthopedic Assessment II. 5 Credits.

Clinical evaluation and diagnosis of the upper extremity, head, and spine. Prereq: HNES 781.

HNES 786. Diagnostic Ultrasound - Shoulder and Knee Basics. 3 Credits.

This course will introduce students to the normal tissue characteristics, common pathology characteristics and shoulder and knee evaluation protocols with musculoskeletal ultrasound.

HNES 787. Evidence Based Therapeutic Modalities. 3 Credits.

An advanced comprehensive examination of therapeutic modalities through readings, discussions, hands-on practice, and research. Emphasis will be on the current literature, how recent research fits into clinical practice, and new modalities/techniques.

HNES 788. Diagnostic Ultrasound - Case Studies and Ankle Basics. 3 Credits.

This course will introduce students to the normal tissue characteristics and common pathology characteristics of the ankle evaluation protocol with musculoskeletal ultrasound. In addition, students will perform shoulder, knee and ankle evaluations on patients in the clinical setting (NDSU Athletic Training Room) to practice their diagnostic ultrasound examination skills and have a better understanding of common pathologies.

HNES 790. Graduate Seminar. 1-3 Credits.**HNES 791. Temporary/Trial Topics. 1-5 Credits.****HNES 792. Graduate Teaching Experience. 1-6 Credits.****HNES 793. Individual Study. 1-5 Credits.****HNES 794. Practicum/Internship. 1-15 Credits.****HNES 795. Field Experience. 1-15 Credits.****HNES 796. Special Topics. 1-5 Credits.****HNES 797. Master's Paper. 1-3 Credits.****HNES 798. Master's Thesis. 1-10 Credits.****HNES 892. Graduate Teaching Experience. 1-6 Credits.****HNES 893. Individual Study/Tutorial. 1-5 Credits.****HNES 894. Practicum/Internship. 1-8 Credits.****HNES 899. Doctoral Dissertation. 1-15 Credits.**

History (HIST)

HIST 101. Western Civilization I. 3 Credits.

Introductory survey of Western Civilization from prehistory to 1648, emphasizing major political, social, cultural, and intellectual developments.

HIST 102. Western Civilization II. 3 Credits.

Introductory survey of Western Civilization from 1648 to the present, emphasizing major political, social, cultural, and intellectual developments.

HIST 103. U.S. to 1877. 3 Credits.

This course explores key events, trends, and concepts in American history from before European contact until the Civil War. Through readings, lectures, and discussion, students will engage with the social, economic, political, and cultural factors at play in the development of the United States to 1865. The course will examine the motivations and effects of European colonization in North America; the causes of the American Revolution and its political, social, and cultural ramifications; the growth of market capitalism and its effects on American society; the course and nature of westward expansion during the nineteenth century; and the emergence, expansion, and eventual end of slavery in the United States.

HIST 104. U.S. Since 1877. 3 Credits.

Survey of United States history since 1877, emphasizing major political, economic, social, and cultural developments.

HIST 130. The American Presidency. 3 Credits.

This course explores the role of the presidency in American history from 1776 to the present. Themes explored include the origins of the office and changing interpretations of the role of the national executive; how the presidency has fit in among other branches of the US government; the execution of presidential leadership during national crises; and the recurring controversies associated with the power of presidents.

HIST 135. Race in U.S. History. 3 Credits.

The historical development of racism and racial ideas and the interactions among Native Americans, European-Americans, and groups of various races from pre-contact to the present.

HIST 194. Individual Study. 1-5 Credits.**HIST 196. Field Experience. 1-15 Credits.****HIST 199. Special Topics. 1-5 Credits.****HIST 220. North Dakota History. 3 Credits.**

Survey of North Dakota history. Includes social, economic, cultural, and political history of North Dakota from prehistoric times to the present.

HIST 251. Introduction To Public History. 3 Credits.

Introduction to history career paths outside of the classroom including museums, historical societies, historic preservation, and historic sites.

HIST 252. Introduction to Museum Work. 3 Credits.

Introduction to the variety of careers available and procedures used in museums and historical societies: curatorial, administrative, conservation, research, and educational. Prereq: HIST 251.

HIST 259. Women in European History 1400-1800. 3 Credits.

Exploration of what it meant to be female in early modern Europe: women's options, how women saw themselves, how they were perceived, and origins of these perceptions.

HIST 270. American Religious History. 3 Credits.

Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with RELS 270.

HIST 271. Introduction to Latin American History. 3 Credits.

Study of important social, economic, and cultural developments in Latin American history. Emphasizes the socio-economic and cultural topical developments and the political and international factors influencing the region.

HIST 280. History of East Asia to 1600. 3 Credits.

The history of East Asia to 1600, focusing on the political, economic, and cultural phenomena critical to the development of traditional China, Japan, and Korea.

HIST 281. History of East Asia from 1600. 3 Credits.

The history of modern East Asia from 1600 to the present, focusing on the political, economic, and cultural phenomena critical to the development of modern China, Japan, and Korea.

HIST 291. Seminar. 1-5 Credits.**HIST 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 294. Individual Study. 1-5 Credits.**HIST 299. Special Topics. 1-5 Credits.****HIST 320. History of Christianity. 3 Credits.**

Major developments in the Christian religion including scriptures, persecution, monasticism, papacy, Reformation, science and religion, and the ecumenical movement. Cross-listed with RELS 320.

HIST 328. War and Society in America. 3 Credits.

This course examines the changes that military conflict has wrought on American society from the colonial era through the War on Terror. Among other topics, readings and discussions will consider the effects of war on gender roles, ideas of racial difference, social and economic organization, politics, and America's relationship to the rest of the world.

HIST 352. Museum Collections Management. 3 Credits.

This course focuses on the fundamental principles of museum collections management, registration, and preservation issues in museums through lectures, hands-on practice, and field trips. Prereq: HIST 251.

HIST 354. The United States in the Long 1960s. 3 Credits.

This course examines the major social, cultural, economic, and political changes within American society and the United States from 1956 to 1974.

HIST 355. History of Global Islam. 3 Credits.

Examination of the foundational history, texts, laws and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa and North America. Cross-listed with RELS 355.

HIST 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 381. Australia & New Zealand. 3 Credits.

Comprehensive, but not exhaustive, historical comparison of Australia and New Zealand with emphasis on formation of national identity(ies). Organized topically to facilitate comparisons.

HIST 390. Historical Research and Writing. 3 Credits.

Techniques and skills of historical research and writing. Includes researching in libraries and archives, constructing thesis statements, outlining papers, building logical arguments, writing clear and concise English, using primary sources, footnoting, and copyediting. Prereq: ENGL 120, junior standing.

HIST 391. Seminar. 1-5 Credits.**HIST 392. Global Practicum: Study Abroad. 1-3 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 394. Individual Study. 1-5 Credits.**HIST 396. Field Experience. 1-15 Credits.****HIST 399. Special Topics. 1-5 Credits.****HIST 401. Archival Theory and Practice. 3 Credits.**

Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies and University Archives. {Also offered for graduate credit - see HIST 601.}.

HIST 403. Archival Preservation. 3 Credits.

This course examines the history, theory and practice of archival preservation, which includes the preservation of manuscripts, photographs, audio-visual and electronic records. Prereq: HIST 251. {Also offered for graduate credit - see HIST 603.}.

HIST 404. Digital History. 3 Credits.

This course will focus on creating digital history, and incorporate readings, discussion, digital fundamentals, creative thinking, and hands-on-learning in a collaborative environment and develop a project based on local history resources. Prereq: at least junior standing. {Also offered at the graduate level - HIST 604.}

HIST 415. Public Memory and Memorialization in America. 3 Credits.

This course examines the construction of public memory and the culture of memorialization in the United States from its earliest years to the present. Among other topics, we will consider how public memory is created, how it changes over time, and how historical and modern-day monuments and memorials came to be constructed.

HIST 420. Colonial American History. 3 Credits.

American history from the Pre-Columbian period through 1763. {Also offered for graduate credit - see HIST 620.}.

HIST 421. Revolutionary America. 3 Credits.

This course examines the causes, process, and effects of the American Revolution from roughly 1763 through 1829. Among other topics, lectures and readings will consider how British authority collapsed, the ideological and economic origins of republicanism, the effects of the Revolution on social, racial, and gender hierarchies, the contested creation of a new republic in its wake, and the economic and social development of the United States in its formative decades. {Also offered for graduate credit - see HIST 621.}.

HIST 422. American Civil War and Reconstruction. 3 Credits.

Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for graduate credit - see HIST 622.}.

HIST 423. The Gilded Age and Progressive America. 3 Credits.

Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for graduate credit - see HIST 623.}.

HIST 424. U.S. History 1917-1960. 3 Credits.

This course covers the political, social, and economic history of the United States from 1917-1960, emphasizing World War I, 1920s, the Great Depression, New Deal, and the early Cold War era. {Also offered for graduate credit - see HIST 624.}.

HIST 425. U.S. History 1917-Present II. 3 Credits.

Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for graduate credit - see HIST 625.}.

HIST 426. Women in American History. 3 Credits.

A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with WGS 426. {Also available for graduate credit - See HIST 626.}.

HIST 430. Prairie Earth, Prairie Homes: A Field School. 3 Credits.

Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. Prereq: Junior standing. {Also offered for graduate credit - see HIST 630.}.

HIST 431. The North American Plains. 3 Credits.

Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for graduate credit - see HIST 631.}.

HIST 434. Environmental History. 3 Credits.

Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for graduate credit - see HIST 634.}.

HIST 435. World Environmental History. 3 Credits.

The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for graduate credit - see HIST 635.}.

HIST 436. American Frontier to 1850. 3 Credits.

Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for graduate credit - see HIST 636.}.

HIST 438. Historical Archaeology. 3 Credits.

Examines the development, methods, and research themes of historical archaeology. Cross-listed with ANTH. {Also offered for graduate credit - See HIST 638.}.

HIST 440. The Ottoman Empire. 3 Credits.

This course examines the growth of the Ottoman Empire after 1300 and then analyzes its responses to a variety of challenges after 1683. We examine Balkan states such as Greece and Serbia, Arab lands such as Iraq and Egypt, and Turkey itself. Topics examined include the role of Islam in Ottoman administration, the rights of religious minorities such as Christians and Jews, and the evolution of Arab nationalism. {Also offered for graduate credit - see HIST 640.}.

HIST 449. Ancient Rome: From Republic to Empire. 3 Credits.

This course offers an introduction to the history of the Roman Republic and Empire, beginning with the legendary founding of the city in 753BC and ending with the Julio-Claudian dynasty. We will focus especially on the transition from the Republic to Empire, that is the dissolution of the Republic and the rise of one-man's rule.

HIST 450. Ancient History. 3 Credits.

Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome. {Also offered for graduate credit - see HIST 650.}.

HIST 451. Medieval History. 3 Credits.

Cultural, political, economic, and social history of the Middle Ages. {Also offered for graduate credit - see HIST 651.}.

HIST 452. The Viking Age. 3 Credits.

This course offers an intensive look at the Scandinavian peoples of Europe in the central Middle Ages, between AD 750 and 1100. While it is true that for nearly three centuries, Viking pirates ravaged the coasts of Europe and terrorized European Christians, these feared Norsemen were also traders and intrepid explorers, who established a network of connections that stretched from North America to Baghdad and who developed a complex society and culture. It is their achievements, political, cultural and religious, that this class seeks to illumine. {Also offered for graduate credit - see HIST 652.}.

HIST 454. Renaissance And Reformation. 3 Credits.

Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for graduate credit - see HIST 654.}.

HIST 456. Europe 1815-1914. 3 Credits.

Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for graduate credit - see HIST 656.}.

HIST 457. Europe Since 1914. 3 Credits.

Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for graduate credit - see HIST 657.}.

HIST 464. Imperial Spain. 3 Credits.

The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for graduate credit - see HIST 664.}.

HIST 465. Germany since 1750. 3 Credits.

This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for graduate credit - see HIST 665.}.

HIST 466. History Of Russia I. 3 Credits.

Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 467. History Of Russia II. 3 Credits.

Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for graduate credit - see HIST 667.}.

HIST 473. Colonial Mexico. 3 Credits.

Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for graduate credit - see HIST 673.}.

HIST 474. Modern Mexico. 3 Credits.

Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for graduate credit - see HIST 674.}.

HIST 475. The Aztec, Maya, and Inca. 3 Credits.

The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for graduate credit - see HIST 675.}.

HIST 477. Slavery in the Atlantic World. 3 Credits.

This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for graduate credit - see HIST 677.}.

HIST 479. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 480. History of Modern China from 1600. 3 Credits.

The history of modern China from 1600 to the present focusing on the expansion of China's empire, confrontation with the West, and the dramatic political and social changes of the 20th century.

HIST 481. History of Japan. 3 Credits.

This course surveys the history of Japan from its myths of creation to the present, focusing on the development of traditional Japanese culture, the rise of the samurai, Japan's response to the West, and the militarization and modernization of Japan during the 20th century.

HIST 482. Vietnam: 125 Years of Conflict. 3 Credits.

The history of Vietnam from the 1850s to the present focusing on French colonial rule, American involvement in the region, revolutionary warfare, and Vietnam's emergence as an autonomous, independent state.

HIST 484. Cultures and Civilizations of the Pre-modern World. 3 Credits.

This course examines the history of human societies in the pre-modern world until 1500, focusing particularly upon the cultural, social, economic and intellectual developments catalyzed by the rise and evolution of civilizations across the globe.

HIST 485. Cultural Exchange and the Making of the Modern World. 3 Credits.

This course examines the globalization of the modern world since 1200, focusing particularly upon the cultural, social, economic and biological exchanges catalyzed by exploration, colonialism, and 19th and 20th century Diasporas.

HIST 486. Plague! Tragedies and Triumphs of Globalization. 3 Credits.

This course examines how, from the Middle Ages to the present, infectious diseases have played a fundamental role in the development of modern modes of economics and government, public health, and modern technologies, thereby shaping global history. {Also offered for graduate credit - See HIST 686.}.

HIST 489. Senior Seminar. 3 Credits.

Capstone experience focused on understanding major concepts and applying knowledge of basic methods and problems. Students evaluate secondary literature, conduct primary research, and master standard forms of historical writing. Prereq: HIST 390.

HIST 491. Seminar. 1-5 Credits.**HIST 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HIST 494. Individual Study. 1-5 Credits.**HIST 496. Field Experience. 1-15 Credits.****HIST 499. Special Topics. 1-5 Credits.****HIST 601. Archival Theory and Practice. 3 Credits.**

Archival theory and its practical application in supervised projects utilizing the resources of the Institute for Regional Studies and University Archives. {Also offered for undergraduate credit - see HIST 401.}.

HIST 603. Archival Preservation. 3 Credits.

This course examines the history, theory and practice of archival preservation, which includes the preservation of manuscripts, photographs, audio-visual and electronic records. {Also offered for undergraduate credit - see HIST 403.}.

HIST 604. Digital History. 3 Credits.

This course will focus on creating digital history, and incorporate readings, discussion, digital fundamentals, creative thinking, and hands-on-learning in a collaborative environment and develop a project based on local history resources. {Also offered at the undergraduate level - HIST 404.}

HIST 615. Public Memory and Memorialization in America. 3 Credits.

This course examines the construction of public memory and the culture of memorialization in the United States from its earliest years to the present. Among other topics, we will consider how public memory is created, how it changes over time, and how historical and modern-day monuments and memorials came to be constructed.

HIST 620. Colonial American History. 3 Credits.

American history from the Pre-Columbian period through 1763. {Also offered for undergraduate credit - see HIST 420.}.

HIST 621. Revolutionary America. 3 Credits.

This course examines the causes, process, and effects of the American Revolution from roughly 1763 through 1829. Among other topics, lectures and readings will consider how British authority collapsed, the ideological and economic origins of republicanism, the effects of the Revolution on social, racial, and gender hierarchies, the contested creation of a new republic in its wake, and the economic and social development of the United States in its formative decades. {Also offered for undergraduate credit - see HIST 421.}.

HIST 622. American Civil War and Reconstruction. 3 Credits.

Political, social, and economic history of the United States 1829-1877; emphasizing socioeconomic change, the Sectional Crisis, the Civil War, and Reconstruction. {Also offered for undergraduate credit - see HIST 422.}.

HIST 623. The Gilded Age and Progressive America. 3 Credits.

Political, social, and economic history of the United States 1877-1917; emphasizing industrialization, urbanization, and progressive reform. {Also offered for undergraduate credit - see HIST 423.}.

HIST 624. U.S. History 1917-1960. 3 Credits.

Political, social, and economic history of the United States 1917-1960; emphasizing the New Deal, the world wars, and the Cold War era. {Also offered for undergraduate credit - see HIST 424.}.

HIST 625. U.S. History 1917-Present II. 3 Credits.

Political, social, diplomatic, and economic history of the United States since 1960; emphasizing foreign policy, domestic developments, and socioeconomic change. {Also offered for undergraduate credit - see HIST 425.}.

HIST 626. Women in American History. 3 Credits.

A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with WGS 626. {Also offered for undergraduate credit - See HIST 426.}.

HIST 630. Prairie Earth, Prairie Homes: A Field School. 3 Credits.

Exploration, investigation, and restoration of earth buildings on the northern plains. Students study the cultures that created earth buildings; encounter the buildings as cultural artifacts; and engage in hands-on restoration work. {Also offered for undergraduate credit - see HIST 430.}.

HIST 631. The North American Plains. 3 Credits.

Historical treatment of the Great Plains of North America as an international region, comprising the Canadian prairies and the American plains. {Also offered for undergraduate credit - see HIST 431.}.

HIST 634. Environmental History. 3 Credits.

Traces the changing relationship between human cultures and the natural world through time, mainly in North America. Examines the causes and consequences of major changes to landscapes and plant and animal species and ecosystems, analyzes the emergence of the conservation and environmental movements, identifies shifts in environmental thought, and traces the development of environmental laws and policies. {Also offered for undergraduate credit - see HIST 434.}.

HIST 635. World Environmental History. 3 Credits.

The course examines the relationship between peoples and their environment over time in selected areas of the world. It focuses on the past two thousand years from the Roman Empire to the present. {Also offered for undergraduate credit - see HIST 435.}.

HIST 636. American Frontier to 1850. 3 Credits.

Early American frontier from 1500's to mid-1800's, emphasizing Indian-White relations, colonial wars, social life in the backcountry, and exploration and settlement. {Also offered for undergraduate credit - see HIST 436.}.

HIST 638. Historical Archaeology. 3 Credits.

Examines the development, methods, and research themes of historical archaeology. Cross-listed with ANTH. {Also offered for undergraduate credit - See HIST 438.}.

HIST 640. The Ottoman Empire. 3 Credits.

This course examines the growth of the Ottoman Empire after 1300 and then analyzes its responses to a variety of challenges after 1683. We examine Balkan states such as Greece and Serbia, Arab lands such as Iraq and Egypt, and Turkey itself. Topics examined include the role of Islam in Ottoman administration, the rights of religious minorities such as Christians and Jews, and the evolution of Arab nationalism. {Also offered for undergraduate credit - see HIST 440.}.

HIST 650. Ancient History. 3 Credits.

Cultural, political, economic, and social history of the ancient Near East, Greece, and Rome. {Also offered for undergraduate credit - see HIST 450.}.

HIST 651. Medieval History. 3 Credits.

Cultural, political, economic, and social history of the Middle Ages. {Also offered for undergraduate credit - see HIST 451.}.

HIST 652. The Viking Age. 3 Credits.

This course offers an intensive look at the Scandinavian peoples of Europe in the central Middle Ages, between AD 750 and 1100. While it is true that for nearly three centuries, Viking pirates ravaged the coasts of Europe and terrorized European Christians, these feared Norsemen were also traders and intrepid explorers, who established a network of connections that stretched from North America to Baghdad and who developed a complex society and culture. It is their achievements, political, cultural and religious, that this class seeks to illumine. {Also offered for undergraduate credit - see HIST 452.}.

HIST 654. Renaissance and Reformation. 3 Credits.

Political, social, and economic history of continental Europe from 1400 to 1650; with a focus on Renaissance and Reformation. {Also offered for undergraduate credit - see HIST 454.}.

HIST 656. Europe 1815-1914. 3 Credits.

Political, social, and economic history of Europe from the defeat of Napoleon to outbreak of World War I. {Also offered for undergraduate credit - see HIST 456.}.

HIST 657. Europe Since 1914. 3 Credits.

Political, social, and economic history of Europe including World War I, the Russian Revolution, Nazism, World War II, and the postwar era. {Also offered for undergraduate credit - see HIST 457.}.

HIST 664. Imperial Spain. 3 Credits.

The history of Spain as a global imperial power, beginning with the marriage of Ferdinand and Isabella in 1469 and concluding with the Latin American wars for independence in the early nineteenth century. {Also offered for undergraduate credit - see HIST 464.}.

HIST 665. Germany since 1750. 3 Credits.

This course traces the evolution of the main German-speaking regions of Europe into modern, industrialized nation-states. From the time of Bach to the fall of the Berlin Wall and beyond, we analyze key trends and events in the politics, society, and culture of Prussia, Imperial Germany, the Weimar Republic, Austria, the Nazi dictatorship, East and West Germany, and the expanded Federal Republic after 1989. {Also offered for undergraduate credit - see HIST 465.}.

HIST 666. History Of Russia I. 3 Credits.

Cultural, diplomatic, intellectual and political history of Russia; evolution of the Russian state, expansion of Imperial Russia, Great Reforms, populism, and socialism.

HIST 667. History of Russia II. 3 Credits.

Cultural, diplomatic, intellectual, and political history of Russia and the Soviet Union; agriculture, industry, Marxism in Russia, revolution of 1905 and 1917, and the Soviet Union from Lenin to present. {Also offered for undergraduate credit - see HIST 467.}.

HIST 673. Colonial Mexico. 3 Credits.

Study of the important social, economic, political, and cultural developments in Mexican history from the pre-Columbian epoch through the wars for independence, ending in 1821. {Also offered for undergraduate credit - see HIST 473.}.

HIST 674. Modern Mexico. 3 Credits.

Study of the important social, economic, political, and cultural developments in Mexican history from independence in 1821 through the contemporary era. {Also offered for undergraduate credit - see HIST 474.}.

HIST 675. The Aztec, Maya, and Inca. 3 Credits.

The history of native peoples in Latin America, including the Aztec, Maya, and Inca, from the pre-Columbian era to the present day. {Also offered for undergraduate credit - see HIST 475.}.

HIST 677. Slavery in the Atlantic World. 3 Credits.

This course examines the social, economic, political, and cultural aspects of the history of slavery in the Atlantic world from the 1400s to 1888 with an emphasis on Brazil and the Caribbean. {Also offered for undergraduate credit - see HIST 477.}.

HIST 679. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HIST 686. Plague! Tragedies and Triumphs of Globalization. 3 Credits.

This course examines how, from the Middle Ages to the present, infectious diseases have played a fundamental role in the development of modern modes of economics and government, public health, and modern technologies, thereby shaping global history. {Also offered for undergraduate credit - See HIST 486.}.

HIST 690. Graduate Seminar. 1-3 Credits.**HIST 695. Field Experience. 1-15 Credits.****HIST 696. Special Topics. 1-5 Credits.****HIST 702. Historiography. 3 Credits.**

An introduction to the history of historical thought, from the classical Greeks to the present, with examination of some of the works of important historians writing in the Western tradition.

HIST 705. Directed Research. 1-4 Credits.

Directed research on the student's thesis prospectus. Taken close to the end of the student's course work. Prereq: HIST 701.

HIST 710. Research Seminar in North American History. 3 Credits.

This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of North American history. May be repeated.

HIST 712. Research Seminar in European History. 3 Credits.

This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of European history. May be repeated.

HIST 714. Research Seminar in World History. 3 Credits.

This course requires preparation of a research paper. The subject of the research will be within an announced general topic area of World history. May be repeated.

HIST 730. Readings in North American History. 3 Credits.

A historiographical survey of a selected topic in North American history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 760. Readings in European History. 3 Credits.

Historiographical survey of a selected topic in European history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 780. Readings in World History. 3 Credits.

Historiographical survey of a selected topic in World history. Topics vary by semester. May be repeated. Recommended Coreq: HIST 701.

HIST 790. Graduate Seminar. 1-3 Credits.**HIST 791. Temporary/Trial Topics. 1-5 Credits.****HIST 793. Individual Study/Tutorial. 1-5 Credits.****HIST 794. Practicum. 1-8 Credits.****HIST 795. Field Experience. 1-15 Credits.****HIST 796. Special Topics. 1-5 Credits.****HIST 797. Master's Paper. 1-3 Credits.****HIST 798. Master's Thesis. 1-10 Credits.****HIST 899. Doctoral Dissertation. 1-15 Credits.**

Honors (HON)

HON 151. Sapien Logic. 3 Credits.

This is a first year seminar for students in the honors program. In this course students examine human thought and imagination from various perspectives, including philosophy, history, literature, religion, science, and art. Students confront the limits of their own personal knowledge and the limits of our collective knowledge as a species. In so doing, students must also consider how we come to know things about our world.

HON 191. Seminar. 1-5 Credits.

HON 193. Undergraduate Research. 1-5 Credits.

HON 251. Leadership Development. 2 Credits.

This honors course will introduce students to both strengths based leadership and essential competencies for leadership development. Experts from across campus will guide students through the competencies. Prereq: Students must be in the honors program to participate in this course.

HON 291. Seminar. 1-5 Credits.

A group of students engaged, under a professor or professors, in research or criticism and in presentation of reports pertaining thereto.

HON 340. Colloquium in the Humanities. 3 Credits.

Interdisciplinary exploration of selected topics in the humanities; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 341. Colloquium in the Social Sciences. 3 Credits.

Interdisciplinary exploration of selected topics in the social sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 342. Colloquium in the Sciences. 3 Credits.

Interdisciplinary exploration of selected topics in the sciences; emphasis on integrating information and perspectives from multiple disciplines and on student participation through discussion, research, writing, and projects. May be repeated for credit with change in topic. Prereq: Admission to Honors program.

HON 386. World Literature: Imaginary Homelands. 3 Credits.

Reading and discussion of works from literatures around the world, including philosophical non-fiction, emphasizing the diversity of responses to the human condition. Prereq: Admission to Honors Program.

HON 391. Seminar. 1-5 Credits.

HON 394. Individual Study. 1 Credit.

HON 396. Field Experience. 1-15 Credits.

HON 489. Senior Thesis. 1-6 Credits.

Primary research or creative activity under the guidance of a faculty member.

HON 491. Seminar. 1-5 Credits.

HON 494. Individual Study. 1-5 Credits.

Human & Community Education (H&CE)

H&CE 194. Individual Study. 1-5 Credits.

H&CE 196. Field Experience. 1-15 Credits.

H&CE 199. Special Topics. 1-5 Credits.

H&CE 232. Philosophy and Policy. 3 Credits.

Principles, philosophies, development, and implementation of agricultural education, family and consumer sciences education, business education, and extension programs. Analysis of evolving concepts with emphasis on history, legislation, and principles underlying organization and practice.

H&CE 291. Seminar. 1-3 Credits.

H&CE 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 294. Individual Study. 1-5 Credits.**H&CE 299. Special Topics. 1-5 Credits.****H&CE 379. Global Seminar. 1-6 Credits.**

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

H&CE 391. Seminar. 1-3 Credits.**H&CE 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 394. Individual Study. 1-5 Credits.**H&CE 399. Special Topics. 1-5 Credits.****H&CE 444. Planning the Community Program in Agricultural Education. 3 Credits.**

Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. Prereq: Admission to School of Education. {Also offered for graduate credit - See H&CE 644.}.

H&CE 445. Technology Transfer In Agriculture. 3 Credits.

Methods of formal and informal educational programs. Attitudes and values as influences on the introduction and acceptance of new and emerging technologies. Emphasizes global issues. Prereq: H&CE 341.

H&CE 446. Extension Education. 3 Credits.

Designed for students from any major who are interested in learning more about the cooperative extension service. The course introduces the cooperative extension mission, philosophy, history, and program areas. Basic program development and evaluation, teaching methods, and extension teaching and delivery methods are also addressed. {Also offered for graduate credit - see H&CE 646.}.

H&CE 467. Advising Family, Career, and Community Leaders of America. 3 Credits.

This course prepares advisors of Family, Career, and Community Leaders of America chapters: prepares Family and Consumer Sciences teachers to build student leadership; and raises awareness of FCCLA resources available to FCS teachers. {Also offered for graduate credit - see H&CE 667.}.

H&CE 468. Methods of Teaching Family and Consumer Sciences I: Techniques. 3 Credits.

Preparation for teaching in the unique field of Family and Consumer Sciences by providing a foundation of practical methods, techniques, and assessments for students of all ages and in various environments. Prereq: Admission to the School of Education.

H&CE 469. Housing Education and Issues. 3 Credits.

Issues, curricula, and techniques for teaching and evaluating K-12 and adult housing programs.

H&CE 474. Extension Internship. 4 Credits.

Supervised full-time family and consumer sciences extension internship in an approved location. Prereq: H&CE 345.

H&CE 480. Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education. 3 Credits.

Methods of planning and teaching in agricultural education laboratories at secondary and post-secondary levels. Learning theories, innovations, and advanced principles in science, technology, engineering and mathematics teaching methods, materials, and ethics. {Also offered for graduate credit - see H&CE 680.}.

H&CE 481. Methods of Teaching Agriculture. 3 Credits.

Methods of planning and teaching agricultural education in secondary and post-secondary settings. Learning theories, innovations and advanced principles in teaching methods and materials, and ethics. Prereq: EDUC 321, EDUC 322, admission to School of Education. {Also offered for graduate credit - see H&CE 681P.}.

H&CE 482. Methods of Teaching Family and Consumer Sciences II: Professional Practices. 3 Credits.

Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning and implementing lessons, units, and courses; and opportunities to examine and practice professionalism. Prereq: EDUC 451 and H&CE 468. {Also offered for graduate credit - see 682P.}.

H&CE 483. Student Teaching Seminar. 1 Credit.

Orientation to student teaching in agricultural education and analysis of professional issues, concerns, and problems associated with AGED, FFA/SAE, and the student teaching experience. Prereq: EDUC 489, EDUC 451, EDUC 486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 487. {Also offered for graduate credit - see H&CE 683P.}.

H&CE 487. Student Teaching. 9 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 489, EDUC 451, EDUC 486, H&CE 232, H&CE 341. For AGED: H&CE 444, H&CE 481. For FACS: H&CE 468, H&CE 482. Coreq: H&CE 483. {Also offered for graduate credit - see H&CE 687P.}.

H&CE 488. Applied Student Teaching. 3 Credits.

Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Prereq: Admission to School of Education, completion of professional education sequence. Coreq: EDUC 485 or H&CE 483P, EDUC 487. Cross-listed with H&CE 488. {Also offered for graduate credit - see H&CE 688P.}.

H&CE 491. Seminar. 1-5 Credits.**H&CE 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

H&CE 494. Individual Study. 1-5 Credits.**H&CE 496. Field Experience. 1-15 Credits.****H&CE 499. Special Topics. 1-5 Credits.****H&CE 644. Planning the Community Program in Agriculture. 3 Credits.**

Determining resources and trends of local communities. Emphasis on agricultural education program policies; planning and managing the primary program components; strategies for the management and organization of youth and adult programming in agricultural education. Prereq: admission to School of Education or permission by the instructor. {Also offered for undergraduate credit - See H&CE 444.}.

H&CE 646. Extension Education. 3 Credits.

Designed for students from any major who are interested in learning more about the cooperative extension service. The course introduces the cooperative extension mission, philosophy, history, and program areas. Basic program development and evaluation, teaching methods, and extension teaching and delivery methods are also addressed. {Also offered for undergraduate credit - see H&CE 446.}.

H&CE 667. Advising Family, Career, and Community Leaders of America. 3 Credits.

This course prepares advisors of Family, Career, and Community Leaders of America chapters: prepares Family and Consumer Sciences teachers to build student leadership; and raises awareness of FCCLA resources available to FCS teachers. {Also offered for undergraduate credit - see H&CE 467.}.

H&CE 668. Methods of Teaching Family and Consumer Sciences I: Techniques. 3 Credits.

Preparation for teaching in the unique field of Family and Consumer Sciences by providing a foundation of practical methods, techniques, and assessments for students of all ages and in various environments. Prereq: Admission to the School of Education. {Also offered for undergraduate credit - see H&CE 468.}.

H&CE 680. Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education. 3 Credits.

Methods of planning and teaching in agricultural education laboratories at secondary and post-secondary levels. Learning theories, innovations, and advanced principles in science, technology, engineering and mathematics teaching methods, materials, and ethics. Prereq: Admission to the School of Education or by permission of the instructor. {Also offered for undergraduate credit - see H&CE 480.}.

H&CE 681P. Methods of Teaching Agriculture. 3 Credits.

Methods of planning and teaching agricultural education in secondary and post-secondary settings. Learning theories, innovations and advanced principles in teaching methods and materials, and ethics. {Also offered for undergraduate credit - see H&CE 481.}.

H&CE 682P. Methods of Teaching Family and Consumer Sciences II: Professional Practices. 3 Credits.

Preparation for teaching in the unique field of Family and Consumer Sciences through discussion of programmatic issues; experiences in planning and implementing lessons, units, and courses; and opportunities to examine and practice professionalism. {Also offered for undergraduate credit - see H&CE 482.}.

H&CE 683P. Student Teaching Seminar. 1 Credit.

Orientation to student teaching in agricultural education and analysis of professional issues, concerns, and problems associated with AGED, FFA/SAE, and the student teaching experience. Prereq: EDUC 689P, EDUC 651P, EDUC 686P. For AGED: H&CE 681P. For FACS: H&CE 682P. Coreq: H&CE 687P. {Also offered for undergraduate credit - see H&CE 483.}.

H&CE 687P. Student Teaching. 9 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar. Prereq: EDUC 689P, EDUC 651P, EDUC 686P. For AGED: H&CE 681P. For FACS: H&CE 682P. Coreq: H&CE 683P. {Also offered for undergraduate credit - see H&CE 487.}.

H&CE 688P. Applied Student Teaching. 3 Credits.

Guided student teaching experience including application of lesson planning, portfolio development, professional goal-setting, and supervised teaching in an approved and accredited school. Coreq: EDUC 685P, EDUC 687P. Cross-listed with H&CE 688P. {Also offered for undergraduate credit - see H&CE 488.}.

H&CE 724. Program Development In Vocational Education. 2 Credits.

Methods and curricula development in vocational family and consumer sciences education in accordance with state and federal guidelines. Includes long-range and strategic planning competencies.

H&CE 740. Vocational Philosophy and Policy. 3 Credits.

Philosophy in developing, planning, and conducting vocational education programs at federal, state, and local levels. Importance of legislation on state and local policy-making.

H&CE 743. Experiential and Learner-Centered Instruction. 3 Credits.

Theory and practice in facilitating learning from experiences in formal and non-formal settings. Special focus is given to experiential learning in classroom/laboratory settings/non-formal settings, guided inquiry, internships/externships/work-based learning, service learning, project-based learning, problem-based learning, and outdoor/adventure learning.

H&CE 746. International Extension. 3 Credits.

The ideological and theoretical basis of world agricultural assistance programs and their effects on different sectors and classes.

H&CE 751. Rural Survey in Agricultural Education. 3 Credits.

Research-type survey of the agricultural education resources unique to the local area/community, research data implications, and current technology implementation. Prereq: Teaching experience, EDUC 702.

H&CE 756. Program Development and Evaluation. 3 Credits.

Methods and procedures of long-range planning, strategic planning techniques, integrating new/emerging biotechnology, guidance and counseling, and evaluating program effectiveness.

H&CE 771. Human Relations for Educators. 3 Credits.

This course will develop an awareness of the constructivist approach to learning and the importance of effective human relations skills needed to enhance learning and well-being for all students.

H&CE 772. Curriculum Development in Family and Consumer Sciences. 3 Credits.

Examination of the major concepts, philosophies, and strategies that influence curriculum decisions in family and consumer sciences programs at all educational levels. Includes assessment of curriculum goals and materials.

H&CE 773. Occupational Programs in Family and Consumer Science. 3 Credits.

Planning and implementing occupational Family and Consumer Science programs in career and technical education. Focus on cooperative education, career pathways and work-based education.

H&CE 774. Teaching Family and Consumer Science with Technology. 3 Credits.

This course will prepare family and consumer science teachers to use technology as a tool in their classrooms by focusing on the knowledge, skills, and attitudes necessary to effectively use a variety of technological applications.

H&CE 775. Internship. 1-3 Credits.

Supervised experience in a formal or informal environment relevant to the application of educational principles. Setting may include middle, secondary, post-secondary, and adult programs.

H&CE 776. Research Design in Family and Consumer Sciences. 3 Credits.

Methods of research in family and consumer sciences; applications in educational settings.

H&CE 777. Evaluation in Family and Consumer Sciences. 3 Credits.

Examination of the role of course assessment, teacher effectiveness, facilities, equipment, and staffing patterns in program evaluation. Review of research on evaluation and exploration of alternative evaluation models.

H&CE 778. Administration of Family and Consumer Sciences Programs. 3 Credits.

Administration of family and consumer sciences programs. Emphasis on educational leadership and related issues in a variety of educational settings.

H&CE 779. Techniques of Supervision in Family and Consumer Sciences. 3 Credits.

This course will cover the philosophy, responsibilities, and techniques of supervision in family and consumer sciences and other learning environments.

H&CE 781. Professional Development in Agricultural Education. 1-3 Credits.

Continued professional development in technical and pedagogical subjects of current importance for professionals in agricultural education.

H&CE 787. Issues In Education. 1-3 Credits.

Exploration and assessment of a current issue associated with middle and secondary applied academic programs. Prereq: Current employment or experience as middle/secondary teacher.

H&CE 790. Graduate Seminar. 1-3 Credits.**H&CE 793. Individual Study/Tutorial. 1-5 Credits.****H&CE 794. Practicum/Internship. 1-15 Credits.****H&CE 795. Field Experience. 1-15 Credits.****H&CE 797. Master's Paper. 1-3 Credits.****H&CE 798. Master's Thesis. 1-10 Credits.**

Human Development & Family Science (HDFS)

HDFS 186. Consumer and Society. 3 Credits.

Consumer rights, responsibilities, and consequences of consumer decision-making. Overview of advertising, fraud, and other issues.

HDFS 194. Individual Study. 1-5 Credits.

HDFS 196. Field Experience. 1-15 Credits.

HDFS 230. Life Span Development. 3 Credits.

Study of human growth and development throughout the life span.

HDFS 242. Couples, Marriages and Families. 3 Credits.

Study of the formation of relationships in varied contexts: examines the diversity of couples, marriages, and families that exists in our contemporary society. Emphasis will be on relationship health as well as barriers to relationship wellness.

HDFS 250. Introduction to Research Methods in Human Development and Family Sciences. 3 Credits.

Undergraduate orientation to research methods in human development and marital/family relationships; students will explore the scientific method as applied to HDFS, methods/issues related to data collection, and methods of data analysis.

HDFS 275. Diversity and Multiculturalism in Individual and Family Life. 3 Credits.

This course includes the study of developmental and family issues as viewed from a perspective of diversity and multiculturalism. Emphasis will be placed on understanding the role of factors such as race, ethnicity, social class, religion, sexual orientation, gender identity, and disability in developmental and family processes.

HDFS 291. Seminar. 1-5 Credits.

HDFS 320. Prenatal, Infant and Toddler Development. 3 Credits.

Study of growth and development of the child from conception to age 3. Prereq: HDFS 230.

HDFS 330. Child Development. 3 Credits.

Study of children, three years through middle childhood. Emphasis on social, cognitive, physical, and emotional development. Prereq: HDFS 230.

HDFS 340. Adolescent Development. 3 Credits.

Study of physical, social, cognitive, and emotional development of adolescents. Includes examination of contemporary issues related to this age group. Prereq: HDFS 230.

HDFS 341. Parent-Child Relations. 3 Credits.

Contemporary parenting principles and strategies. Emphasis on application in the home and professional settings. Prereq: HDFS 230 or HDFS 242.

HDFS 350. Fundamentals of Hospital Child Life. 3 Credits.

Introduction to the child life profession through exploring the needs of hospitalized children. Child development theories will be used to understand coping and intervention techniques for the hospitalized child. Prereq: HDFS 230. Co-req: HDFS 250.

HDFS 353. Children, Families and Public Policy. 3 Credits.

Interaction of the national economy and the family economy with regard to the public programs affecting well-being of families. Emphasis on philosophies of service delivery and policy alternatives. Prereq: HDFS 230 and HDFS 242.

HDFS 357. Personal and Family Finance. 3 Credits.

Factors influencing decisions on acquiring and using financial resources and budgeting to achieve goals. Overview of credit, taxation, savings, insurance, and investments. Prereq: HDFS 242.

HDFS 360. Adult Development and Aging. 3 Credits.

Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood. Prereq: HDFS 230.

HDFS 389. Pre-Field Experience. 2 Credits.

In this course, HDFS majors will prepare for field experience and engage in career exploration. Students will undertake the process of selecting a field experience site, setting goals for internship, and completing training requirements needed prior to field experience. Additionally, students will be introduced to various career options in HDFS, explore personal career interests, and plan for the career launching process. Prereq: 6 credits of HDFS 300-400 level courses. Restrictions: HDFS Major/Minor or instructor permission.

HDFS 390. Career Development. 1 Credit.

Analysis and integration of professional perspectives and trends; life career development skills (self-assessment, resume writing, interviewing, and correspondence.) 1 lecture. Prereq: Junior standing.

HDFS 394. Individual Study. 1-5 Credits.

HDFS 424. Observation and Assessment of Children. 3 Credits.

Overview of observation/assessment of children for research and practice application. Prereq: HDFS 320, 330.

HDFS 430. Topics in Cognitive Development. 3 Credits.

Understanding the fundamentals of cognitive development in children, adolescents and/or adults. Topics vary each time the course is offered and may include cognition, perception, concepts, reasoning, memory, and language. May be repeated for credit with change in subtopic. Prereq: 6 credits of HDFS 300-400 level coursework.

HDFS 435. Topics in Socioemotional Development. 3 Credits.

Understanding the fundamentals of socio-emotional development in children, adolescents and/or adults. Topics vary each time the course is offered and may include temperament, peer relations, moral development, emotional development, gender development, or development of self-concept. May be repeated for credit with change in subtopic. Prereq: 6 credits of HDFS 300-400 level coursework.

HDFS 445. Topics in Family Science: (sub-topic). 3 Credits.

Advanced study of specific topic areas in Family Science. Topics vary each time the course is offered and may include mate selection, divorce, step-families, poverty, etc. May be repeated for credit with change in subtopic. Prereq: 6 credits of HDFS 300-400 level coursework and students must be a major with junior or senior standing in HDFS, WGS or FACS.

HDFS 448. Issues In Sexuality. 3 Credits.

Study of personal, interpersonal, and societal meanings of human sexuality. Decision making relevant to sexual behavior. Prereq: HDFS 230 and HDFS 242 and HDFS 250 and junior or senior standing.

HDFS 462. Methods of Family Life Education. 3 Credits.

Introduces students to the study of various family issues including crisis, stress, diversity and change and the role of family life education as a method of preventing or mediating family distress. Prereq: 6 credits of HDFS 300-400 level coursework. Restrictions: Junior or Senior standing; HDFS, FACS or WGS majors or minors only.

HDFS 468. Families and Work. 3 Credits.

Issues, opportunities and problems related to the interface of work and family. Topics include household division of labor, trends in the labor market, and work-family policy. Prereq: HDFS 242 and HDFS 250 and junior or senior standing. {Also offered for graduate credit - see HDFS 668.}.

HDFS 477. Financial Counseling. 3 Credits.

Advanced analysis of family financial issues. Evaluation of alternative financial programs. Prereq: HDFS 357 and 3 credits of HDFS 300-level coursework. {Also offered for graduate credit - see HDFS 677.}.

HDFS 480. Community Resources of Later Life. 3 Credits.

This course will expose students to the various policies and programs focused on providing services to older adults. Additionally, this course will emphasize the theoretical knowledge that underscores an understanding of the social and psychological dynamics of help seeking behavior in later life. Prereq: HDFS 230 and HDFS 250 and junior or senior standing.

HDFS 482. Family Dynamics of Aging. 3 Credits.

Examination of issues related to family life in the later years from the perspectives of aging individuals and their families. Prereq: HDFS 242 and HDFS 250 and junior or senior standing. {Also offered for graduate credit - see HDFS 682.}.

HDFS 483. Best Practices, Play and Activities from Birth Through Adolescence. 3 Credits.

This course will provide students with an in-depth understanding of play at various ages, as well as provide guidance in planning and understanding the use of developmentally appropriate practices, activities and materials from infancy through adolescence. A strong emphasis on play as an essential element of development, theories of play, guided play and play development will be incorporated into this course. Prereq: HDFS 320 and HDFS 330. Co-req: HDFS 340.

HDFS 491. Seminar. 1-5 Credits.**HDFS 494. Individual Study. 1-5 Credits.****HDFS 496. Field Experience. 1-15 Credits.****HDFS 499. Special Topics. 1-5 Credits.****HDFS 677. Financial Counseling. 3 Credits.**

Advanced analysis of family financial issues. Evaluation of alternative financial programs. {Also offered for undergraduate credit - see HDFS 477.}.

HDFS 682. Family Dynamics of Aging. 3 Credits.

Examination of issues related to family life in the later years from the perspectives of the elderly and the family. Prereq: 6 credits social science. {Also offered for undergraduate credit - see HDFS 482.}.

HDFS 696. Special Topics. 1-5 Credits.**HDFS 705. Quantitative Methods in Developmental Science. 4 Credits.**

This course is an introduction to research methods and quantitative analyses commonly used in developmental science. Special emphasis will be placed on the unique methodological features associated with the field. Prereq: Graduate standing in HDFS or Developmental Science.

HDFS 710. Foundations of Youth Development. 1 Credit.

This course provides an introduction to the field of positive youth development (PYD) including an overview of key theory and practice principles that enhance the profession of youth work. This course is designed to provide a foundation of basic knowledge and skills that students will need to be successful in any course in the Great Plains-IDEA Youth Development programs.

HDFS 711. Youth Development. 3 Credits.

An introduction to the developmental period of adolescence through the lens of theory and research in positive youth development. The course emphasizes how the developmental tasks of this life stage are influenced by (and influence) family and home, school, peers, and other contextual forces. Students critically examine theoretical and research literature and become familiar with major issues and transitions adolescents face.

HDFS 712. Positive Youth Development in Community Settings. 3 Credits.

This course uses a strengths-based or asset-based approach to community youth development and encompasses individual development (i.e. positive youth development) and adolescents' interrelationships with their environments. Emphasis is placed on research, theory, and practice applied to communities throughout the U.S. Students will explore existing models, read theoretical and applied literature, and examine current community efforts as a basis for understanding community youth development.

HDFS 713. Adolescents and Their Families. 3 Credits.

This course explores adolescent development in the context of the family. The bi-directional influences between adolescents and their families will be examined. Implications for professionals working with youth and families will be explored and highlighted.

HDFS 714. Contemporary Youth Issues. 3 Credits.

This course presents issues faced by youth today and associated risk and resiliency factors. A different topic is presented each year. Past topics have included Youth Violence, Youth and Appearance, and Volunteerism. The course may be taken more than once, as long as the topic areas are different each time.

HDFS 715. Youth Culture. 3 Credits.

This course examines youth as a culture, and youth culture within multiple contexts (education, peers, work, sports, family, technology, music, media, politics, and activism). Students will think critically about how society supports and restricts youth culture, and gain further knowledge of how ethnic groups fit historically into society and how history has shaped current youth culture. Students will address biases and myths about youth and explore the social and educational processes experienced by youth through in-depth reading, writing, discussion, critical listening, viewing of contemporary videos, and informal interviews with youth.

HDFS 716. Youth Professionals as Consumers of Research. 3 Credits.

Students will learn the basics of quantitative and qualitative research approaches that will enable them to understand, evaluate, and critique research articles. Students will be able to judge the validity and usefulness of research articles in order to guide their educational or therapeutic interventions or public policy decisions.

HDFS 717. Design and Evaluation of Youth Programs. 3 Credits.

This course focuses on the principles and methods of the design and evaluation of youth programs. Students will learn about hands-on tools for conducting evidence-based planning and evaluating the performance and delivery of a program. Students will develop knowledge through participating in a community-based project involving the practical application of program design and evaluation methods. The goal is to prepare students for research supported planning and evaluation of programs that aim at positive youth development.

HDFS 718. Youth Development Personnel and Program Management. 3 Credits.

This course introduces students to the development, administration, and management of youth programs and youth-serving organizations with special focus being on the roles and responsibilities of administrators and managers.

HDFS 719. Youth Policy. 3 Credits.

This course examines various federal and state policies that affect developmental opportunities for youth. Students will examine how and why such policies are constructed. We will explore how various policies contribute to or undermine positive youth development outcomes.

HDFS 720. Basic Grant Development and Management. 1 Credit.

This course introduces students to the grant development and management process. Restricted to HDFS MS or PhD program students only.

HDFS 721. Adult Development and Aging. 3 Credits.

Study of development during adulthood and later life. Emphasis on perceptual-motor and cognitive functioning, personality, adjustment, social, familial, and cultural aspects of adulthood.

HDFS 722. Methods and Theories in Gerontology. 3 Credits.

Study of theories and methods (quantitative and qualitative) in Gerontology.

HDFS 723. Perspectives in Gerontology. 3 Credits.

Examination of current research, theories and controversies within the field of gerontology.

HDFS 729. Professional Seminar in Gerontology. 3 Credits.

Integrative experience for gerontology students; designed to be taken near the end of the degree program.

HDFS 740. Theories & Research in Family Financial Planning I. 3 Credits.

Introduction to the social science of family financial planning: Theories of family functioning, microeconomic theory related to family resource allocation decisions, the family as an economic unit, and interaction of the family and the economy.

HDFS 741. Theories & Research in Family Financial Planning II. 3 Credits.

Macroeconomic theory as it relates to family resource allocation decisions, theories of household behavior, lifecycle hypothesis, behavioral economics, behavioral finance, theories of behavioral change, and psychological theories of family well-being. Focus on empirical research investigating household financial decision-making. Prereq: HDFS 740.

HDFS 750. Culture and Aging: Global and Multicultural Perspectives. 3 Credits.

Using a cross-cultural perspective, this course explores the developmental processes of aging in various social and cultural contexts, both within the U.S. and across the globe. Focus will be specifically on how culture influences the processes and experience of aging as well as well-being during late-life.

HDFS 760. Aging Policy. 3 Credits.

Formation, implementation and impact of policies that affect the well-being of the elderly in the United States.

HDFS 761. Applications in Gerontology. 3 Credits.

Study of the applications of gerontology research and theory. The course will provide an overview of programs, methods and evaluations of services for older adults.

HDFS 762. Retirement Planning, Employee Benefits and the Family. 3 Credits.

Critical examination of micro and macro considerations in retirement planning for individuals and families.

HDFS 763. Personal Income Taxation. 3 Credits.

Study of principles and concepts of personal income tax planning as they relate to families.

HDFS 765. Insurance Planning for Families. 3 Credits.

An in-depth study of risk management concepts, tools, and strategies for individuals and families.

HDFS 766. Estate Planning for Families. 3 Credits.

Study of principles and concepts of estate planning as they relate to families.

HDFS 767. Professional Practices in Family Financial Planning. 3 Credits.

Study of strategies and methods for managing private family financial planning practices including ethics, compensation, client-centered marketing and practice management.

HDFS 768. Housing/Real Estate. 3 Credits.

Overview of the role of housing and real estate in the family financial planning process including taxation, law, mortgages, ethics and financial calculations.

HDFS 769. Financial Planning Case Studies. 3 Credits.

Examines professional issues in family financial planning including ethics, regulation on certification, communication, and professional responsibility. Emphasis on personal finance case studies and investment policy.

HDFS 770. Fundamentals of Financial Planning. 3 Credits.

Survey of personal/family financial planning including process, time value of money, cash management, credit, taxation, insurance, housing, investments, retirement, and estate planning.

HDFS 771. Investing for the Family's Future. 3 Credits.

Study of the concepts of time and risk value of money in evaluating investment markets.

HDFS 772. Military Personal Financial Readiness. 3 Credits.

Preparation of Financial Counselors and Planners regarding the unique needs and resources of military service members and their families. Focus on mission readiness and overall financial well-being.

HDFS 790. Graduate Seminar. 1-3 Credits.**HDFS 791. Temporary/Trial Topics. 1-5 Credits.****HDFS 793. Individual Study/Tutorial. 1-5 Credits.****HDFS 794. Practicum/Internship. 1-8 Credits.****HDFS 795. Field Experience. 1-15 Credits.****HDFS 796. Special Topics. 1-5 Credits.****HDFS 797. Master's Paper. 1-3 Credits.****HDFS 797S. Comprehensive Project. 1-6 Credits.****HDFS 798. Master's Thesis. 1-10 Credits.****HDFS 801. Graduate Orientation Seminar. 1 Credit.**

Introduction to graduate program, faculty, policies and procedures.

HDFS 802. Teaching Developmental Science. 3 Credits.

Introduction to research and theory on college teaching, including course preparation, grading, and classroom management. Emphasis on acquiring skills related to teaching in developmental science.

HDFS 805. Professional Development in Developmental Science. 1 Credit.

This course serves to facilitate professional development among graduate students in developmental science. Students will discuss methods for succeeding in graduate school, presenting and publishing research, and searching for jobs.

HDFS 811. Developmental Concepts and Theories. 3 Credits.

This course is an advanced study of the theories and concepts of development throughout the lifespan. Students will be introduced to relevant historical and current theoretical work on biological, cognitive, and socio-emotional human development. Using interdisciplinary lifespan perspectives, we will explore conceptualizations of developmental change and examine implications for research and applications.

HDFS 813. Social and Emotional Development Across the Lifespan. 3 Credits.

This course is an advanced study of the concepts and research of social and emotional development throughout the lifespan. Students will critically evaluate historical, recent, and current empirical research on social and emotional development in the field of developmental science, and explore applications across the lifespan. Restrictions: HDFS Doctoral Student, or Instructor Permission.

HDFS 815. Physical and Cognitive Development Across the Lifespan. 3 Credits.

Critical examination of physical and cognitive change in human development across the lifespan, including major theories and key research in the area. Emphasis will be on the interplay of genetic/physical and contextual factors on development. Restrictions: HDFS doctoral student or Instructor Permission.

HDFS 817. Prevention Science. 3 Credits.

This course examines the field of prevention science and intervention programs in the context of human development, relationships and well-being across the lifespan. Restrictions: Human Development and Family Science doctoral student, or instructor permission.

HDFS 824. Advanced Topics in Socioemotional Development. 3 Credits.

Critical examination of socio-emotional development. Topics vary each time the course is offered and may include temperament, peer relations, moral development, emotional development, gender development, or development of self-concept. May be repeated for credit with change in subtopic.

HDFS 825. Advanced Topics in Cognitive Development. 3 Credits.

Critical examination of cognitive development. Topics vary each time the course is offered and may include cognition, perception, concepts, reasoning, memory, and language. May be repeated for credit with change in subtopic.

HDFS 830. Issues and Theories in Family Science. 3 Credits.

Exploration of foundational and contemporary theories that form the basis of the family science discipline. Examination of the complexities of family relationships and issues in a variety of contexts and life stages.

HDFS 854. Advanced Quantitative Methods in Developmental Science. 3 Credits.

Survey of advanced quantitative methods typically used in research in Developmental Science. Areas covered will include mid-level and advanced multivariate analyses, including use of SPSS software, interpretation of results, and use in current literature. Prereq: HDFS 705.

HDFS 856. Longitudinal Research Methods and Analysis. 3 Credits.

The primary focus will be on multilevel models (general linear mixed models or hierarchical linear models) as applied to studies in human development. Topics will include the measurement of change over time and the modeling of individual differences in growth trajectories by the inclusion of both time invariant and time varying covariates. Prereq: HDFS 705.

HDFS 874. Contemporary Grant Writing. 3 Credits.

This course covers all aspects of contemporary grant writing in the fields of human development and family science and couple and family therapy. Course topics include grant planning and development, writing successful proposals, budgeting, and grant management. Restrictions: Students must be enrolled in a PhD program in Couple and Family Therapy or Developmental Science or receive permission from the instructor.

HDFS 890. Graduate Seminar. 1-5 Credits.**HDFS 892. Graduate Teaching Experience. 1-6 Credits.****HDFS 893. Individual Study/Tutorial. 1-5 Credits.****HDFS 894. Practicum/Internship. 1-8 Credits.****HDFS 899. Doctoral Dissertation. 1-15 Credits.**

Human Sciences and Education (HSE)

HSE 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, AGRI 189, BUSN 189, ME 189 and UNIV 189. F, S.

HSE 191. Seminar. 1-5 Credits.**HSE 194. Individual Study. 1-3 Credits.****HSE 196. Field Experience. 1-15 Credits.****HSE 199. Special Topics. 1-5 Credits.****HSE 291. Seminar. 1-3 Credits.****HSE 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HSE 294. Individual Study. 1-5 Credits.

HSE 299. Special Topics. 1-5 Credits.

HSE 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HSE 391. Seminar. 1-5 Credits.

HSE 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HSE 394. Individual Study. 1-5 Credits.

HSE 396. Field Experience. 1-15 Credits.

HSE 399. Special Topics. 1-5 Credits.

HSE 491. Seminar. 1-5 Credits.

HSE 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HSE 494. Individual Study. 1-5 Credits.

HSE 496. Field Experience. 1-15 Credits.

HSE 499. Special Topics. 1-5 Credits.

HSE 690. Graduate Seminar. 1-5 Credits.

HSE 696. Special Topics. 1-5 Credits.

HSE 790. Graduate Seminar. 1-5 Credits.

HSE 793. Individual Study. 1-5 Credits.

HSE 794. Practicum/Internship. 1-8 Credits.

Humanities (HUM)

HUM 194. Individual Study. 1-5 Credits.

HUM 196. Field Experience. 1-15 Credits.

HUM 199. Special Topics. 1-5 Credits.

HUM 291. Seminar. 1-5 Credits.

HUM 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HUM 294. Individual Study. 1-5 Credits.

HUM 299. Special Topics. 1-5 Credits.

HUM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

HUM 385. Comparative Arts. 3 Credits.

Study of Western arts in light of the aesthetic, social, and philosophical ideas that nurtured them.

HUM 391. Seminar. 1-3 Credits.

HUM 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HUM 394. Individual Study. 1-5 Credits.

HUM 399. Special Topics. 1-5 Credits.

HUM 487. Aesthetics. 3 Credits.

Principles of aesthetics as revealed by artists, writers, and philosophers. Cross-listed with PHIL 487.

HUM 491H. Seminar. 3 Credits.

HUM 491. Seminar. 1-5 Credits.

HUM 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

HUM 494. Individual Study. 1-5 Credits.

HUM 494H. Individual Study. 1-5 Credits.

HUM 496. Field Experience. 1-15 Credits.

HUM 499. Special Topics. 1-5 Credits.

Industrial and Manufacturing Engineering (IME)

IME 111. Introduction to Industrial and Manufacturing Engineering. 3 Credits.

Overview of industrial engineering and manufacturing engineering professional careers and work environments. Basic skill acquisition using computer software tools to solve engineering problems, prepare reports, plan projects, deliver professional presentations, and manage data.

IME 194. Individual Study. 1-5 Credits.

IME 196. Field Experience. 1-15 Credits.

IME 199. Special Topics. 1-5 Credits.

IME 291. Seminar. 1-3 Credits.

IME 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 294. Individual Study. 1-5 Credits.

IME 299. Special Topics. 1-5 Credits.

IME 311. Work/Station Design and Measurement. 3 Credits.

Analytical methods for measuring human performance in industrial, commercial and manufacturing settings. Development of work procedures and design of workstations. Considerations of ergonomics, safety, performance effectiveness and efficiency, interactions between workstations, information and data requirements, production throughput, training and skill requirements, and resources. Weekly laboratory. Prereq: IME 111.

IME 330. Manufacturing Processes. 3 Credits.

Traditional manufacturing processing methods as employed in contemporary practice. Includes properties of materials, machining, casting, forming, and fabrication techniques. Several experiments will be conducted on various manufacturing processes in the laboratory. Prereq: ME 212.

IME 335. Welding Technology. 3 Credits.

Study of arc and gas welding technology together with related metallurgy. Laboratory instruction in welding techniques and skills. 2 recitations, 1 two-hour laboratory.

IME 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

IME 380. CAD/CAM for Manufacturing. 3 Credits.

Coverage of CAD, numerical control, and CAM software. Use of manufacturing standards for geometric dimensioning and tolerancing. Prereq: ME 212.

IME 391. Seminar. 1-3 Credits.

IME 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 394. Individual Study. 1-5 Credits.**IME 397. Fe/Coop Ed/Internship. 1-4 Credits.****IME 399. Special Topics. 1-5 Credits.****IME 411. Human Factors Engineering. 3 Credits.**

A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. Prereq: IME 311, IME 460. {Also offered for graduate credit - see IME 611.}.

IME 427. Packaging for Electronics. 3 Credits.

Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Prereq: Junior standing. Cross-listed with ECE 427. {Also offered for graduate credit - see IME 627.}.

IME 429. Introduction to IC Fabrication. 3 Credits.

This course examines issues about fabrication methods and procedures. Topics will include implantation, pattern transfer and process integration. Cross-listed with ECE 429.

IME 430. Process Engineering. 3 Credits.

Comprehensive analysis of selected manufacturing processes; mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Prereq: IME 330 and MATH 266. {Also offered for graduate credit - see IME 630.}.

IME 431. Production Engineering. 3 Credits.

Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Prereq: IME 330. Recommended: IME 430/630. {Also offered for graduate credit - see IME 631.}.

IME 432. Composite Materials Manufacturing. 3 Credits.

Processes for manufacturing products from fiber-reinforced composite materials. Analysis of tooling, process variables and quality management during processing. Design of processes for manufacture of selected composite parts. Weekly laboratory. Prereq: IME 330, ME 331.

IME 433. Additive Manufacturing. 3 Credits.

A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. Prereq: IME 330. {Also offered for graduate credit - see IME 633.}.

IME 435. Polymer Processing in Manufacturing. 3 Credits.

Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Prereq: MATH 266. Cross-listed with ME 435. {Also offered for graduate credit - see IME 635.}.

IME 437. Methods for Precision Manufacturing. 3 Credits.

Fundamental principles and applications of methods of precision micro- and nano-scale manufacturing of discrete parts and assembled products made of metallic and non-metallic engineering materials. Prereq: IME 430 and ME 331. {Also offered for graduate credit - see IME 637.}.

IME 440. Engineering Economy. 2-4 Credits.

Capital investment decision foundation within the rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle, and buy-rent-lease decisions. Prereq: Junior standing or IME major. {Also offered for graduate credit - see IME 640.}.

IME 450. Systems Engineering and Management. 3 Credits.

Integration of technical disciplines through the stages of systems life cycle: needs and requirements determination, operating and support concepts, design and prototyping, test and evaluation, facilitation, manuals, training, and supportability. Prereq: Junior standing. {Also offered for graduate credit - see IME 650.}.

IME 451. Logistics Engineering and Management. 3 Credits.

This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. Prereq: IME 470. Coreq: IME 450. {Also offered for graduate credit - see IME 651.}.

IME 453. Hospital Management Engineering. 3 Credits.

Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. {Also offered for graduate credit - see IME 653.}.

IME 456. Program and Project Management. 3 Credits.

Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. Prereq: Junior standing. {Also offered for graduate credit - see IME 656.}.

IME 460. Evaluation of Engineering Data. 3 Credits.

Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. Coreq: MATH 166. {Also offered for graduate credit - see IME 660.}.

IME 461. Quality Assurance and Control. 3-4 Credits.

Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 460. {Also offered for graduate credit - see IME 661.}.

IME 462. Total Quality In Industrial Management. 3 Credits.

The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. {Also offered for graduate credit - see IME 662.}.

IME 463. Reliability Engineering. 3 Credits.

Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerate life testing, reliability improvement. Prereq: IME 460. {Also offered for graduate credit - see IME 663.}.

IME 464. Reliability Analysis. 3 Credits.

System modeling and analysis, designing for reliability, reliability testing, reliability in manufacturing, and reliability management, fault tree analysis, RBD, and cut sets are covered along with sneak circuits, time-on-test plots and acceptance testing. Prereq: IME 460 and IME 463. {Also available for graduate credit - See IME 664.}.

IME 465. Introduction to Machine Learning. 3 Credits.

Machine learning uses interdisciplinary techniques such as statistics, linear algebra, and optimization to create automated systems that can sift through large volumes of data at high speeds to make predictions or decisions. This class will cover topics in linear regression (multivariate, subset selection, RIDGE & LASSO, and model selection), basic classification methods (kNN, Naïve Bayes, logistic regression, LDA, and SVM), and the concept of unsupervised learning (k-means cluster and PCA). Prereq: IME 460.

IME 470. Operations Research I. 3 Credits.

Techniques to optimize and analyze industrial operations. Use of linear programming, transportation models, networks, integer programming, goal programming, dynamic programming, and non-linear programming. Prereq: MATH 129. Co-req: IME 460. {Also offered for graduate credit - see IME 670.}.

IME 472. Simulation of Business and Industrial Systems. 3 Credits.

Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 460, high-level computer language. {Also offered for graduate credit - see IME 672.}.

IME 480. Production and Inventory Control. 3 Credits.

Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 460. {Also offered for graduate credit - see IME 680.}.

IME 482. Automated Manufacturing Systems. 3 Credits.

Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 two-hour laboratory. Prereq: IME 311, IME 330, PHYS 252. {Also offered for graduate credit - see IME 682.}.

IME 485. Industrial and Manufacturing Facility Design. 3 Credits.

Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. {Also offered for graduate credit - see IME 685.}.

IME 489. Industrial and Manufacturing Engineering Capstone. 3 Credits.

Capstone experience. Student projects in design, analysis, and experimental investigation related to industrial and manufacturing engineering. Prereq: IME 482 and senior standing with less than 36 hours of required class work to graduate.

IME 491. Seminar. 1-5 Credits.**IME 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

IME 493. Undergraduate Research. 1-5 Credits.

Student research, scholarly project or creative investigation completed under the guidance of a faculty mentor. Directed independent project, collaborative work or ongoing participation in faculty research should culminate in a presentation, article or scholarly project.

IME 494. Individual Study. 1-5 Credits.**IME 496. Field Experience. 1-15 Credits.****IME 499. Special Topics. 1-5 Credits.****IME 611. Human Factors Engineering. 3 Credits.**

A survey of human factors engineering topics with an emphasis on optimizing person-machine and person-system interactions. Human physical and cognitive capabilities will be investigated to improve work design, interface design, and usability. {Also offered for undergraduate credit - see IME 411.}.

IME 627. Packaging for Electronics. 3 Credits.

Processes and materials for packaging of electronic components and devices, including integrated circuit chips, chip packages, and board level packaged systems; boards and substrates technology; quality and reliability of electronic packages. Open to all engineering majors. Cross-listed with ECE 627. {Also offered for undergraduate credit - see IME 427.}.

IME 630. Process Engineering. 3 Credits.

Comprehensive analysis of selected manufacturing processes; development of process flow maps, schematic and mathematical modeling of process dynamics, and evaluation of processing alternatives. Design of effective and efficient processes for selected industrial products. Seminar/case study format. {Also offered for undergraduate credit - see IME 430.}.

IME 631. Production Engineering. 3 Credits.

Design of a production system for selected manufactured products, development of production system flow maps and linked process dynamic models, evaluation of throughput and identification of constraints. Evaluation of alternative solutions for production constraints. Undergraduate: design of fixtures, dies and tooling for economical production. Graduate: In-depth analysis of contemporary production systems for selected manufactured products; development of production systems issues. Seminar/case study format. Recommended: IME 630. {Also offered for undergraduate credit - see IME 431.}.

IME 633. Additive Manufacturing. 3 Credits.

A synchronized approach considering functional design, analysis and manufacturing that support seamless integration of geometry with performance. The course will address additive manufacturing principles; scope of additive manufacturing; bio-manufacturing. {Also offered for undergraduate credit - see IME 433.}.

IME 635. Plastics and Injection Molding Manufacturing. 3 Credits.

Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Cross-listed with ME 635. {Also offered for undergraduate credit - see IME 435.}.

IME 637. Methods for Precision Manufacturing. 3 Credits.

Fundamental principles and applications of methods of precision micro- and nano-scale manufacturing of discrete parts and assembled products made of metallic and non-metallic engineering materials. {Also offered for undergraduate credit - see IME 437.}.

IME 640. Engineering Economy. 2-4 Credits.

Capital investment decision foundation within the rules of general and project accounting. Analysis of benefits and returns against cost for engineering installation, operation, life cycle, and buy-rent-lease decisions. Prereq: Junior standing or IME major. {Also offered for undergraduate credit - see IME 440.}.

IME 650. Systems Engineering and Management. 3 Credits.

Integration of technical disciplines through the stages of systems life cycle: needs and requirements determination, operating and support concepts, design and prototyping, test and evaluation, facilitation, manuals, training, and supportability. {Also offered for undergraduate credit - see IME 450.}.

IME 651. Logistics Engineering and Management. 3 Credits.

This course emphasizes integrated logistics management methods to improve the effectiveness and efficiency of material flow, information flow and cash flow for the entire supply chains. {Also offered for undergraduate credit - see IME 451.}.

IME 653. Hospital Management Engineering. 3 Credits.

Survey of management engineering roles in the delivery of health care. Review of functional relationships present in health care delivery systems. Application of industrial engineering tools to solve health care delivery problems focused on cost reduction, process redesign, facility design, quality improvement, and systems integration. Prereq: Core IME courses. {Also offered for undergraduate credit - see IME 453.}.

IME 656. Program and Project Management. 3 Credits.

Integrated approaches to managing engineering, technology and business projects, addressing the project management lifecycle including initiating, planning, executing, controlling and closing. Additional topics include program management, portfolio management, and applying principles in a business environment. {Also offered for undergraduate credit - see IME 456.}.

IME 660. Evaluation of Engineering Data. 3 Credits.

Design of engineering experiments and evaluations, curve fitting, regression, hypothesis testing, ANOVA, Taguchi methods in engineering design. {Also offered for undergraduate credit - see IME 460.}.

IME 661. Quality Assurance and Control. 3-4 Credits.

Proactive and reactive quality assurance and control techniques; emphasis on quality planning, statistical process control, acceptance sampling, and total quality management. Issues in reliability and maintainability engineering. Prereq: IME 660. {Also offered for undergraduate credit - see IME 461.}.

IME 662. Total Quality In Industrial Management. 3 Credits.

The meaning and means for achieving 'total quality' in all dimensions of industrial activities and organizations. Topics include continuous improvement, statistical process control, leadership, and training. {Also offered for undergraduate credit - see IME 462.}.

IME 663. Reliability Engineering. 3 Credits.

Study and application of statistical models and methods for defining, measuring and evaluating reliability of products, processes and services: life distributions, reliability functions, reliability configurations, reliability estimation, parametric reliability models, accelerated life testing, reliability improvement. Prereq: IME 660. {Also offered for undergraduate credit - see IME 463.}.

IME 664. Reliability Analysis. 3 Credits.

System modeling and analysis, designing for reliability, reliability testing, reliability in manufacturing, and reliability management, fault tree analysis, RBD, and cut sets are covered along with sneak circuits, time-on-test plots and acceptance testing. Prereq: IME 660 and IME 663. {Also available for undergraduate credit - See IME 464.}.

IME 670. Operations Research I. 3 Credits.

Techniques to optimize and analyze industrial operations. Use of linear programming, transportation models, networks, integer programming, goal programming, dynamic programming, and non-linear programming. {Also offered for undergraduate credit - see IME 470.}.

IME 672. Simulation of Business and Industrial Systems. 3 Credits.

Development of the fundamentals and techniques of simulating business and industrial systems. Monte-Carlo techniques and computer usage. Prereq: IME 660, high-level computer language. {Also offered for undergraduate credit - see IME 472.}.

IME 680. Production and Inventory Control. 3 Credits.

Planning and controlling of industrial production and inventory: demand forecasting, master scheduling, materials requirements planning, job scheduling, assembly line balancing, and just-in-time production. Prereq: IME 660. {Also offered for undergraduate credit - see IME 480.}.

IME 682. Automated Manufacturing Systems. 3 Credits.

Design of integrated production systems including flexible, programmed automatic control for fabrication, assembly, packaging, movement, and storage. Numerical control, flexible manufacturing systems, and computer integrated manufacturing. 2 recitations, 1 two-hour laboratory. {Also offered for undergraduate credit - see IME 482.}.

IME 685. Industrial and Manufacturing Facility Design. 3 Credits.

Capstone integration of analysis and design tools to convert product design into production plans and plants. Prereq: Senior standing. {Also offered for undergraduate credit - see IME 485.}.

IME 690. Graduate Seminar. 1-3 Credits.**IME 696. Special Topics. 1-5 Credits.****IME 765. Data Analysis. 3 Credits.**

Applications oriented. Topics include: statistical estimation, hypothesis testing, non-parametric methods, design of experiments, factorial experiments, response surface methodology, regression analysis, time series analysis and forecasting, multivariate methods, statistical control charts. Prereq: IME 660.

IME 770. Quantitative Modeling. 3 Credits.

Applications modeling and optimization methods. Domains: transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Decision models: linear programming and sensitivity analysis, transportation and assignment, network models and algorithms, and integer, dynamic and nonlinear programming. Cross-listed with ENGR 770.

IME 771. Probabilistic and Deterministic Methods. 3 Credits.

Applications modeling. Domains include transportation, logistics, manufacturing, service systems scheduling, and supply-chain management. Quantitative models and tools include Markov chains, stochastic processes, queuing, deterministic and stochastic decision analysis, time series, forecasting, and regression modeling. Prereq: IME 660. Cross-listed with ENGR 771.

IME 774. Neural Networks. 3 Credits.

Introduction to the parallel processing paradigms that have been developed recently including neuronetworks and genetic algorithms. Students will work on projects using these tools. Prereq: CSCI 724. Cross-listed with PSYC 774 and CSCI 735.

IME 780. Advanced Production and Inventory Control. 3 Credits.

Study of the theory and applications of production scheduling, inventory management, production planning, just-in-time production, and materials requirement planning. Prereq: IME 680. F (even years).

IME 790. Graduate Seminar. 1-3 Credits.

IME 791. Temporary/Trial Topics. 1-5 Credits.

IME 793. Individual Study/Tutorial. 1-5 Credits.

IME 795. Field Experience. 1-15 Credits.

IME 796. Special Topics. 1-5 Credits.

IME 797. Master's Paper. 1-3 Credits.

IME 798. Master's Thesis. 1-10 Credits.

IME 899. Doctoral Dissertation. 1-15 Credits.

International Studies (INTL)

INTL 110. Introduction to International Studies. 3 Credits.

An interdisciplinary course which introduces students to a variety of global topics, concepts, and perspectives.

INTL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

INTL 394. Individual Study. 1-5 Credits.

INTL 401. Life and Politics of US-Mexico Borderlands. 3 Credits.

This course is designed to help students access a greater understanding of the political and cultural realities of the US-Mexico Borderlands through academic texts, literature, pop culture, and history. This is a reading intensive course.

INTL 488. Integrated Senior Project Proposal. 1 Credit.

This course is designed to provide an opportunity for students in the International Studies major to develop their Integrative Senior Project in collaboration with their peers and NDSU faculty.

INTL 489. Integrative Senior Project. 2 Credits.

This course involves the independent research and writing of an integrative senior project paper which will serve as the capstone of the International Studies major. Prereq: INTL 488 and International Studies majors only.

INTL 494. Individual Study. 1-5 Credits.

INTL 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

Landscape Architecture (LA)

LA 172. Environmental Design II. 3 Credits.

Introduction to design studio, with practice in representational media, techniques and skills exploring drawing, visual abstraction, visual literacy relating to environmental design problem-solving, visual resolution of form and proportion, and graphic communication.

LA 191. Seminar. 1-3 Credits.

LA 192. Study Abroad. 1-15 Credits.

LA 194. Individual Study. 1-5 Credits.

LA 199. Special Topics. 1-5 Credits.

LA 231. Digital Media + Methods Technology. 3 Credits.

Introductory study of digital technology applications and processes within Landscape Architecture. Course focus towards digital creation and production methods including the introduction of common printing and fabrication devices. Prereq: Environmental Design or Architecture major.

LA 232. Design Technology. 3 Credits.

Introductory exploration of digital design media and environmental technology in landscape architecture. Prereq or Co-req: ARCH 271 or LA 271.

LA 271. Introduction to Landscape Architecture Studio. 6 Credits.

Entry-level design generation methods involving concept formation, site inventory and analysis, programming, and simple site organization and planning. Problem solving through graphic, computer-generated, and model development; oral and written communication skills. Prereq: Environmental Design major or minor.

LA 291. Seminar. 1-3 Credits.**LA 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 294. Individual Study. 1-5 Credits.**LA 299. Special Topics. 1-5 Credits.****LA 321. History of Landscape Architecture. 4 Credits.**

Survey of landscape design from prehistoric civilizations, Rome, the Renaissance, Asian landscapes, the birth of landscape architecture, and contemporary design movements. Emphasis on analyzing historic landscapes as a problem-solving method.

LA 331. Graphics III: Design Communication. 3 Credits.

Advanced exploration into computer applications, technologies, and design techniques as related to landscape architecture. Course emphasis towards proficient digital drafting, graphical representation and presentation strategies. Prereq: LA 232 and Landscape Architecture or Architecture majors only.

LA 341. Site Development and Detailing I. 4 Credits.

Intermediate investigations into site planning and design development with a primary focus on site design integration with the technically-related concepts. Prereq for LA majors: Second-year standing. Prereq for ARCH majors: ARCH 272.

LA 342. Site Development and Detailing II. 4 Credits.

Intermediate-level focus on fundamental site landscape and engineering issues within the construction process. Emphasis on site grading and storm water management. Lecture. Prereq: LA major or minor.

LA 371. Site Planning & Design Studio. 6 Credits.

Visual problem solving and large-scale site planning issues. Two-part focus involving the comprehensive visual inventory and analysis along with the immediate application of site planning and design skills. Studio. Prereq: LA major, LA 272.

LA 372. Community Planning & Design Studio. 6 Credits.

Cultural and environmental design issues as they relate to large-scale land planning and site design involved with residential communities. Emphasis within the studio involves site engineering and design detailing. Course includes a field trip. Prereq: LA major, LA 371.

LA 374. Park + Open Space Design Studio. 6 Credits.

Design and concept development strategies in the context of both urban and rural open space systems, and behavioral configurations. Intermediate problem solving through two two- and three-dimensional graphics techniques; continued oral and written communication skills. Prereq: Environmental Design major, LA 271.

LA 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

LA 391. Seminar. 1-3 Credits.**LA 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 394. Individual Study. 1-5 Credits.**LA 396. Field Experience. 1-15 Credits.****LA 399. Special Topics. 1-5 Credits.****LA 422. Planting Theory and Practice. 3 Credits.**

Acquired methods advancing plant design with ecological and cultural applications in rural/urban environments. Design principles, visual properties, plant communities, structural and ornamental planting. Current garden themes, styles and construction methods.

LA 441. Site Development and Detailing III. 4 Credits.

Advanced exploration into the use of computers and computer-aided design as part of the landscape architecture construction documentation process. Seminar/laboratory. Prereq: LA 372. Coreq: LA 471.

LA 471. Urban Design Studio. 6 Credits.

Regional systems inventory, visual survey, analysis techniques, and methodologies for design problem solving through graphic, computer, and modeling development. Focus on urban studies and site planning. Studio. Prereq: LA major, LA 372.

LA 472. Remediation & Planting Design Studio. 6 Credits.

Natural resource and land reclamation management techniques as part of contemporary design in landscape architecture. Emphasis on presentation and communication. Capstone course. Course includes a field trip. Prereq: LA major, LA 471.

LA 491. Seminar. 1-5 Credits.**LA 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LA 494. Individual Study. 1-5 Credits.**LA 496. Field Experience. 1-15 Credits.****LA 563. Programming and Thesis Preparation. 3 Credits.**

Discussion and application of a comprehensive design process for production of the design thesis. Emphasis on preparing a design program. Prereq: LA 472.

LA 571. Environmental Planning Studio. 6 Credits.

Environmental systems development and implementation of a complex design problem. Emphasis on landscape architecture design development through graphic, computer, and modeling techniques. Studio. Prereq: LA major, LA 472. Coreq: LA 563.

LA 572. Design Thesis. 8 Credits.

Capstone opportunity as a culmination of design education. Student generated design topic is fully developed and realized from master planning through design development, detailing, and documentation. Prereq: LA 563, LA 571.

LA 581. Professional Practice. 3 Credits.

Study of contemporary architectural practice covering professional development, firm organization, and project management within the context of the ethical, legal, and regulatory environment. Cross-listed with ARCH 681. Prereq: LA 472.

LA 590. Seminar. 1-5 Credits.**LA 593. Individual Study/Tutorial. 1-5 Credits.****LA 596. Special Topics. 1-5 Credits.****LA 722. Advanced Landscape Planning. 3 Credits.**

Theories and practices facing landscape architects and planners in the design of urban, suburban, and rural landscapes. Seminar/field trip. Prereq: LA major or minor.

LA 763. Landscape Architecture Thesis Research & Programming. 3 Credits.

An application of research methodologies and the research required to complete a design thesis in a first professional degree program in Architecture at the graduate level. Completion of a Thesis Proposal and a Thesis Research document in preparation for the Design Thesis Studio to follow.

LA 771. Performance Based Design Studio. 6 Credits.

Design of sustainable sites and quality communities with themes that promote the approach of parametric and data driven design in landscape architecture. Strategies, technologies, metrics tools, and practices regarding evaluating site performances will be introduced. Prereq: LA 472, LA 441.

LA 772. Landscape Architecture Graduate Thesis. 6 Credits.

Student generated design solution assimilating the theoretical, social, environmental, technical and ethical practices of Landscape Architecture. Advanced exploration into research/analysis, design development and presentation methods as a culmination of graduate education. Prereq: LA 771.

LA 781. Professional Practice. 3 Credits.

Study of contemporary landscape architectural practice covering professional development, firm organization, project management, SITES 2.0 within the context of the ethical, legal, sustainable, and regulatory environment. Prereq: LA 472.

LA 789. Professional Topics in Landscape Architecture. 3 Credits.

Various topics related to theoretical or methodological aspects of landscape architecture as a professional discipline. May be repeated. Prereq: Students must be Architecture or Landscape Architecture majors only.

Leadership (LEAD)

LEAD 394. Individual Study. 1-5 Credits.**LEAD 494. Individual Study. 1-5 Credits.****LEAD 790. Graduate Seminar. 1-5 Credits.****LEAD 793. Individual Study/Tutorial. 1-5 Credits.****LEAD 890. Seminar. 1-5 Credits.****LEAD 893. Individual Study/Tutorial. 1-5 Credits.**

Library Science (LIB)

LIB 194. Individual Study. 1-5 Credits.

LIB 196. Field Experience. 1-15 Credits.

LIB 199. Special Topics. 1-5 Credits.

LIB 291. Seminar. 1-3 Credits.

LIB 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LIB 294. Individual Study. 1-5 Credits.

LIB 299. Special Topics. 1-5 Credits.

LIB 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

LIB 391. Seminar. 1-3 Credits.

LIB 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LIB 394. Individual Study. 1-5 Credits.

LIB 399. Special Topics. 1-5 Credits.

LIB 491. Seminar. 1-5 Credits.

LIB 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LIB 494. Individual Study. 1-5 Credits.

LIB 496. Field Experience. 1-15 Credits.

LIB 499. Special Topics. 1-5 Credits.

Management (MGMT)

MGMT 320. Foundations of Management. 3 Credits.

Study of the major functional areas of management including an international perspective of management. Restricted to College of Business professional major or minor, and a 2.50 minimum NDSU grade point average.

MGMT 330. Foundations of Organizational Behavior. 3 Credits.

A behavioral approach to management with emphasis on the understanding of individual behavior in groups in organizations. Topics include motivation, communication, perception, and cultural diversity. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MGMT 394. Individual Study. 1-5 Credits.

MGMT 430. Leadership in Organizations. 3 Credits.

A comprehensive study of the principles, practices, and challenges of contemporary leadership and followership. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 630.}.

MGMT 434. Leading Virtual Teams. 3 Credits.

The recent advances in technologies and the growth of multi-national operations make leading virtual teams an essential skill for leaders to develop a high-performance team. In this course, students will acquire the theoretical and practical tools to lead a virtual team effectively. Prereq: MGMT 320.

MGMT 440. International Management. 3 Credits.

Focused on management challenges associated with business activity across national boundaries. Development of management skills for global contexts. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 640.}.

MGMT 450. Human Resource Management. 3 Credits.

Survey of human resource management, including job analysis, recruitment, selection, performance appraisal, compensation, training, and labor relations. The impact of environmental influences such as legislation, court decisions, and unions on human resource activities are addressed. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 650 .}.

MGMT 451. Negotiation and Alternative Dispute Resolution. 3 Credits.

An exploration of negotiation and conflict settlement in interpersonal, business, and international settings. Topics include techniques used in negotiations, and alternative dispute resolution procedures such as mediation and arbitration. May be repeated. Prereq: MGMT 320. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 651 .}.

MGMT 452. Compensation Management. 3 Credits.

Study of the human resource management function of compensation. Topics include the job analysis, job evaluation, wage determination, pay-for-performance, and employee benefits. The impact of compensation on recruitment, satisfaction, and performance is examined. Prereq: MGMT 450. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 652.}.

MGMT 453. Understanding and Managing Diversity in Organizations. 3 Credits.

Use of case analysis and experiential learning to consider the theoretical perspectives and practical implications of different forms of diversity at three management levels: personal values and actions; group dynamics; institutional policies and practices. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MGMT 454. Labor-Management Relations. 3 Credits.

Analysis of human resource management in the presence of labor unions. Topics include: labor history, labor law, organizing unions, contract negotiation and administration, contract dispute resolution, labor-management cooperation, and strikes. Prereq: MGMT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 654.}.

MGMT 470. Entrepreneurship/Small Business Management. 3 Credits.

A comprehensive entrepreneurship/small business course that examines entrepreneurial ideas, processes, individuals; new venture creation and growth (including franchises and family business); and application of management, marketing, and finance tools to the small business context. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MGMT 471. Leading the Nonprofit Organization. 3 Credits.

This course covers theories, tools, and perspectives for leading and managing nonprofit organizations; exploration of similarities and differences between nonprofits and business firms; discussion of current and controversial issues in the nonprofit sector - all emphasizing practical applications for nonprofit leadership in managerial, staff, and volunteer roles. {Also offered for graduate credit - see MGMT 671 .}.

MGMT 472. Managing Family Enterprises. 3 Credits.

A comprehensive family business course that examines governance, conflict management, succession, and topics pertinent to family businesses. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MGMT 494. Individual Study. 1-5 Credits.**MGMT 496. Field Experience. 1-15 Credits.****MGMT 499. Special Topics. 1-5 Credits.****MGMT 630. Leadership in Organization. 3 Credits.**

This course will give students a comprehensive view of the principles, practices, and challenges of contemporary leadership and followership. {Also offered for undergraduate credit - see MGMT 430.}.

MGMT 640. International Management. 3 Credits.

Focused on management challenges associated with business activity across national boundaries. Development of management skills for global contexts. {Also offered for undergraduate credit - see MGMT 440.}.

MGMT 650. Human Resource Management. 3 Credits.

Survey of human resource management, including job analysis, recruitment, selection, performance appraisal, compensation, training, and labor relations. The impact of environmental influences such as legislation, court decisions, and unions on human resource activities are addressed. {Also offered for undergraduate credit - see MGMT 450.}.

MGMT 652. Compensation Management. 3 Credits.

Study of the human resource management function of compensation. Topics include the job analysis, job evaluation, wage determination, pay-for-performance, and employee benefits. The impact of compensation on recruitment, satisfaction, and performance is examined. Prereq: MGMT 650. {Also offered for undergraduate credit - see MGMT452.}.

MGMT 654. Labor-Management Relations. 3 Credits.

Analysis of human resource management in the presence of labor unions. Topics include: labor history, labor law, organizing unions, contract negotiation and administration, contract dispute resolution, labor-management cooperation, and strikes. {Also offered for undergraduate credit - see MGMT 454.}.

MGMT 661. Supply Chain Management. 3 Credits.

Identification of the key elements in a firm's management of their supply chain. Theory and practical applications for analyzing and developing strategies to assist firms in obtaining and maintaining a competitive advantage. {Also offered for undergraduate credit - see MGMT 461.}.

MGMT 671. Leading the Nonprofit Organization. 3 Credits.

This course covers theories, tools, and perspectives for leading and managing nonprofit organizations; exploration of similarities and differences between nonprofits and business firms; discussion of current and controversial issues in the nonprofit sector - all emphasizing practical applications for nonprofit leadership in managerial, staff, and volunteer roles. {Also offered for undergraduate credit - see MGMT 471.}.

MGMT 696. Special Topics. 1-5 Credits.**MGMT 727. Organizational Change Management. 3 Credits.**

Change management as the process of making either incremental improvements or radical changes to an organization for the purpose of enhancing both organizational and individual effectiveness. A multi-perspective systems viewpoint is employed, stressing pragmatic implications for leadership.

MGMT 793. Individual Study. 1-5 Credits.**MGMT 893. Individual Study/Tutorial. 1-5 Credits.**

Management Information Systems (MIS)

MIS 194. Individual Study. 1-5 Credits.**MIS 196. Field Experience. 1-15 Credits.****MIS 199. Special Topics. 1-5 Credits.****MIS 291. Seminar. 1-3 Credits.****MIS 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 294. Individual Study. 1-5 Credits.**MIS 299. Special Topics. 1-5 Credits.****MIS 315. System Analysis and Design. 3 Credits.**

Introduction to the front end of the software development life cycle. Includes various modern concepts, techniques, and tools for analyzing and designing well-structured software systems. Prereq: CSCI 161 or CSCI 228.

MIS 320. Management Information Systems. 3 Credits.

Introduction to basic concepts and developments in information technology. Overview of the opportunities and challenges in the development and management of organizational information systems from a socio-technical perspective. Prereq: CSCI 116 or MIS 116. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 340. Applied Business Intelligence. 3 Credits.

A hands-on look at Business Intelligence as applied to managerial decision making by exploring techniques for information creation including business analytics, data visualization, scorecards, dashboards and data mining. Prereq: MIS 320.

MIS 350. Enterprise Systems. 3 Credits.

Introduction to the theoretical and practical issues related to the application of enterprise systems within organizations. Prereq: MIS 320 and CSCI 161 or CSCI 228 and students must be College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 371. Web Scripting Languages. 3 Credits.

This course examines Scripting Languages and their applications. Emphasis will be placed on web scripting. A representative set of scripting languages will be covered. Prereq: CSCI 122 or CSCI 160 or CSCI 227 or ECE 173. Cross-listed with CSCI 371. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 375. Database Design for Business Application. 3 Credits.

Fundamentals of conceptualizing and implementing databases. Emphasis is on using query languages to obtain information for decision-making. Includes managerial topics related to database administration, security, integrity, optimization, and distributed databases. Prereq: MIS 320, CSCI 228. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 376. Data and Telecommunications Administration. 3 Credits.

Introduction to a wide variety of topics in the voice and data communications field. Prereq: MIS 320, CSCI 228. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 391. Seminar. 1-3 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 397. Fe/Coop Ed/Internship. 1-4 Credits.**MIS 399. Special Topics. 1-5 Credits.**

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 413. MIS Service Internship. 3 Credits.

Supervised professional information technology experience in a non-paid position. Offered on a Pass/Fail basis only.

MIS 470. Information Systems. 3 Credits.

Exploration of managerial issues pertaining to administration of the information systems function in organizations. Issues include planning, operations, control, electronic commerce, and other current topics. Prereq: MIS 375, CSCI 315. Coreq: MIS 376. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 479. Business Data Mining and Predictive Analytics. 3 Credits.

Information system support and modeling of the decision-making process via business data analytics techniques such as decision trees, neural networks, and machine learning are the primary focus of this course. The state-of-the-art technologies in business data analytics will be explored. Prereq: MIS 320.

MIS 491. Seminar. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MIS 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 496. Field Experience. 1-15 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 499. Special Topics. 1-5 Credits.

Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MIS 705. Programming for Business Analytics. 2 Credits.

The course introduces the basics of programming languages required to perform tasks in the business analytics workflow, such as data cleansing, data transformation, data visualization, and predictive analytics modeling. Prereq: Admission into the MSBA program or permission of the MSBA program director.

MIS 710. Database Management. 2 Credits.

This course provides a foundational understanding of the management, conceptualization, development, and implementation of databases. It covers normalization, structured query language (SQL), distributed databases, and conceptual modeling using entity-relationship (ER) diagrams. Case examples of modeling data in an organizational context will be utilized. Prereq: Open to MSBA students or with permission of the instructor.

MIS 720. Visualization and Reporting. 2 Credits.

This course provides advanced usage of quantitative analysis using spreadsheets, in-memory database, and development of effective dashboards. Emphasis is on the application of theoretical understanding of the human interaction with the user interface to facilitate communication and story-telling using data. Effectively communicating analysis results to a management and business audience using dashboards and reports to enhance decision-making is examined. Prereq: Open to MSBA students or with permission of instructor.

MIS 740. Advanced Business Analytics Methods. 2 Credits.

This course develops an understanding of practical applicability of advanced analytics methods in a variety of business scenarios. The course is designed to provide hands-on opportunities for students to work with data and apply advanced business analytics techniques and machine learning, which include text mining, natural language processing, web analytics, social analytics, and simulation. Prereq: MBA 753 and open to MSBA students or with permission of the instructor.

MIS 770. Information Resources Management. 3 Credits.

Role of information resources in supporting organizational functions by providing a managerial perspective on use, design, and evaluation of information systems; use of information technologies for making and communicating decisions, and interacting with business functions. Prereq: Departmental approval.

MIS 790. Graduate Seminar. 1-5 Credits.

MIS 793. Indiv Study/Tutorial. 1-5 Credits.

MIS 795. Field Experience. 1-15 Credits.

MIS 796. Special Topics. 1-5 Credits.

Marketing (MRKT)

MRKT 320. Foundations of Marketing. 3 Credits.

Survey of the four basic areas of marketing: product, price, place, and promotion. Exposure to consumer behavior and strategic marketing from an international perspective. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. Credit awarded only for MRKT 301 or MRKT 320 (formerly BUSN 360), not both.

MRKT 362. Foundations of Retailing. 3 Credits.

Analysis of the global retail environment and exposure to issues such as the development of retailing image, location theory, inventory management, and integrated marketing communication. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MRKT 372. Global Retailing. 3 Credits.

Theoretical approach to management practices and marketing policies for retail soft goods in a complex and changing world market. Prereq: 2.5 cumulative GPA and MRKT 320 or ADHM 171. Cross-listed with ADHM 372.

MRKT 410. Consumer Behavior. 3 Credits.

Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 610.}.

MRKT 420. Advertising and Integrated Marketing Communication. 3 Credits.

Examination of the use of advertising as part of the worldwide marketing function; prepares the student to analyze and plan integrated marketing communication campaigns. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 620.}.

MRKT 430. Sales and Personal Selling. 3 Credits.

Examination of the theoretical frameworks, principles, and the methods related to sales and the personal selling process. Co-req: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - See MRKT 630.}.

MRKT 434. Sales Management. 3 Credits.

This course provides students with a basic understanding of functions, tasks, and decisions involved in sales management. Specific topics include planning, organizing, implementing, and monitoring and controlling the sales effort. Prereq: MRKT 320, 430 and College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered as a graduate course: MRKT 634.}.

MRKT 436. Advanced Professional Selling. 1 Credit.

This course focuses on advanced professional selling frameworks and decisions involved in the sales process. Specific topics include advanced needs inquiry and solution development. Prereq: MRKT 320 and MRKT 430 and a cumulative 2.50 NDSU GPA. Co-req: MRKT 434.

MRKT 438. Customer Relationship Management (CRM) and Sales Technology. 3 Credits.

Introduction to principles of customer relationship management, sales automation, and use of different technologies in professional sales. Prereq: MRKT 320 and a cumulative NDSU GPA of 2.50 or higher.

MRKT 440. International Marketing. 3 Credits.

Focused on identifying and satisfying global customer needs better than the competition, both domestic and international, and coordinating marketing activities within the context of the global environment. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 640 .}.

MRKT 450. Marketing Research. 3 Credits.

Study of marketing research methods with focus on research design, data collection, and analysis techniques. Prereq: MRKT 320, STAT 331 and MATH 144 or MATH 146. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 650.}.

MRKT 460. Marketing Strategy. 3 Credits.

The analysis, planning, implementation, and control of worldwide marketing programs to achieve an organization's objectives including an examination of the progress of the Internet for the marketing of goods and services. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MRKT 465. Digital Marketing. 3 Credits.

This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media and mobile marketing, reputation management and online retailing will be considered. Prereq: MRKT 320 and College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

MRKT 470. Services Marketing. 3 Credits.

This course focuses on management and strategic issues as they relate to the marketing of services. Prereq: MRKT 320. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MRKT 670.}.

MRKT 494. Individual Study. 1-5 Credits.**MRKT 497. FE/Coop Ed/Internship. 1-15 Credits.****MRKT 499. Special Topics. 1-5 Credits.****MRKT 610. Consumer Behavior. 3 Credits.**

Examination of dimensions of consumer buying theories. Aimed at understanding the buying behavior of customers. {Also offered for undergraduate credit - see MRKT 410.}.

MRKT 630. Sales and Personal Selling. 3 Credits.

Examination of the theoretical frameworks, principles, and the methods related to sales and the personal selling process. {Also offered for undergraduate credit - see MRKT 430.}.

MRKT 634. Sales Management. 3 Credits.

This course provides students with a basic understanding of functions, tasks, and decisions involved in sales management. Specific topics include planning, organizing, implementing, and monitoring and controlling the sales effort. {Also offered as an undergraduate course: MRKT 434.}.

MRKT 640. International Marketing. 3 Credits.

Focused on identifying and satisfying global customer needs better than the competition, both domestic and international, and coordinating marketing activities within the context of the global environment. {Also offered for undergraduate credit - see MRKT 440.}.

MRKT 650. Marketing Research. 3 Credits.

Study of marketing research methods with focus on research design, data collection, and analysis techniques. {Also offered for undergraduate credit - see MRKT 450.}.

MRKT 670. Services Marketing. 3 Credits.

This course focuses on management and strategic issues as they relate to the marketing of services. {Also offered for undergraduate credit - see MRKT 470.}.

MRKT 696. Special Topics. 1-5 Credits.**MRKT 793. Individual Study. 1-5 Credits.**

Master of Business Administration (MBA)

MBA 701. Strategic Cost Management. 2 Credits.

This course introduces managerial accounting for decision making and control in profit-directed organizations. It also defines product costing, budgetary control systems, and performance evaluation systems for planning, coordinating, and monitoring the performance of a business. Students will understand how modern organizations use managerial accounting to effectively plan and control operations and make sound business decisions. Prereq: Admission to MBA program.

MBA 702. Advanced Financial Management. 2 Credits.

In-depth coverage of concepts and decision-making tools in financial analysis, cost of capital, capital structure, capital budgeting, and dividend policy through analyzing competitive situations and developing strategic views of key financial dimensions. Prereq: Admission to MBA program.

MBA 703. Advanced Organizational Behavior. 2 Credits.

This course is intended to introduce you to the essentials of the most important organizational behavior concepts and principles through instruction, reading, cases, and experience. The course focuses on practical and useful information and skills which will aid you in managing and working in an organization. The course will use evidence-based research to examine and explore the relationship between individual, team, and organizational characteristics and individual outcomes. Prereq: Admission to MBA program.

MBA 704. Supply Chain and Operations Management. 2 Credits.

Study of analysis and decision-making directed at creating, producing, and bringing goods and services to market under uncertain business conditions. Includes techniques from project management, supply chain management, quality management, inventory management, forecasting, and productions planning. Prereq: Admission to MBA program.

MBA 705. Strategic Marketing Management. 2 Credits.

Focus on the conceptual framework, managerial approach and analysis of deploying marketing resources to communicate and deliver value. Prereq: Admission to MBA program.

MBA 706. Managing Information Resources. 2 Credits.

Managerial perspectives on the role of information resources in supporting organizational functions including the strategic use of information systems; use, design, and evaluation of information resources; use of information technologies for managerial decision making, and IT support of different and business functions. Prereq: Admission to the MBA program.

MBA 707. Microeconomics for Managers. 2 Credits.

This course will provide students with an understanding of microeconomic tools for managerial decision making. Students will learn how to use an understanding of economics to make better value maximization decisions for their company. Course topics will include supply/demand principles, demand elasticity and estimation, production and costs, market structure, strategic interaction, complex pricing problems, and decisions under risk. Prereq: Admission to MBA program.

MBA 708. Advanced Strategic Management. 2 Credits.

This course teaches from the perspective of top management, integrating functional business expertise into analysis of the firm's internal resources and capabilities with analysis of the external environment in which the firm competes, to enable formulation and implementation of company strategy. Prereq: MBA 701, MBA 702, MBA 703, MBA 704, MBA 705, MBA 706.

MBA 711. Advanced Investment Analysis. 2 Credits.

This course provides students with a fundamental understanding of investments and the theory and practice of financial valuation. Students will learn how to value a publicly listed company after identifying key internal and external investment factors. Students will deliver a detailed research recommendation on a stock investment idea. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through valuation analysis and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 712. Advanced Portfolio Management. 2 Credits.

This course provides students with a fundamental understanding of investments and the theory and practice of modern portfolio management. Students will gain in-depth knowledge of portfolio construction and performance evaluation. Students will use Bloomberg terminals in the Commodity Trading Lab to gain hands-on experience through portfolio management and have the opportunity to participate in the Student Managed Investment Fund (Bison Fund). Students will deliver a written report and detailed presentation of their portfolio results. This course will also be useful for students who are planning to take the CFA (Chartered Financial Analyst) exams. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 713. Financial Derivatives. 2 Credits.

This course is designed to enable students to understand the nature and functions of financial derivatives, including the various futures and options contracts. It covers the role of derivatives markets, the characteristics of derivative products, pricing methodology, and trading strategy of derivatives.

MBA 714. Financial Analysis and Valuation. 2 Credits.

The goal of this course is to develop MBA students' ability to use financial information and related disclosures to evaluate the underlying economics of a firm. This course covers the theory and practice of financial analysis and valuation, and particularly focuses on the analysis, interpretation and prediction of firm financial performance, such as profitability and risks, operating and non-operating cash flows, and management of strategic financing and investing. Prereq: Admission to the MBA program.

MBA 721. Creating and Marketing Innovations. 2 Credits.

This course focuses on creating and enhancing customer value through new products and services. Students will learn the value of new product strategy and new product development process from opportunity identification to launch. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 722. Marketing Analytics and Customer Intelligence. 2 Credits.

This course takes a very hands-on approach with customer intelligence and equips students with the marketing science understanding and techniques they need to solve real-world marketing challenges. This course uses a combination of lectures, cases, and exercises. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 723. Digital Marketing. 2 Credits.

This course focuses on understanding, managing and analyzing an organization's digital marketing strategy. Topics related to online business models, search engine optimization, paid search and display advertising, web analytics, email marketing, social media marketing and reputation management will be considered. Prereq: Admission to the MBA program.

MBA 724. Integrated Marketing Communications. 2 Credits.

This course focuses on marketing communications management in terms of strategy development, implementation, and evaluation. It examines the effects of changing environmental circumstance on integrated marketing communications and promotional strategy - budget allocation, messages, and media vehicles adopted. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 731. Leading and Managing Teams. 2 Credits.

This course is designed to prepare students to effectively develop, lead, and manage teams. We will examine and practice team development. We will examine critical team processes and how to manage these processes. We will have the opportunity to practice both the management skills and leadership skills necessary to have effective collaboration among team members. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 732. Managerial Leadership: Essential Competencies. 2 Credits.

This course is designed to prepare graduate students for the role of being a managerial leader. We will examine and practice the essential competencies such as creating a compelling purpose, role clarification inspiration/motivation, problem solving, team building needed as a manager and a leader. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 733. Management Decision Making. 2 Credits.

This course provides tools and experiences to allow managers to become more sophisticated and effective decision makers. It examines logical processes relating to decision making, but also incorporates behavioral and organizational aspects of decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 734. Negotiations and Alternative Dispute Resolution. 2 Credits.

This course is designed to provide practical negotiating knowledge primarily through hands-on experiential exercises. Topics covered are useful to the practicing manager and readings and lectures are designed to reinforce lessons learned during actual negotiations. Some of the topics covered: using agents in negotiation, conflict resolution, alternative dispute resolution, establishing value, working across diverse contexts, and employing (and defending) against common negotiation tactics. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 735. Global Business. 2 Credits.

This course exposes students to economic, financial, marketing, and strategic views of international business to enable students to better understand the challenges and opportunities firms face competing in the global business arena. Prereq: Admission to the MBA program.

MBA 751. Business Analytics Concepts. 2 Credits.

This course covers important business data analytics concepts including data warehousing, OLAP, ETL, data mining, self-service business intelligence, and business reporting and visualization tools. It provides hands-on experience in the use of some popular data analytics software tools with a focus on aiding managerial decision-making across different business functional areas. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 752. Business Analytics Strategy. 2 Credits.

Case-based discussion course examining how data analytics impact organizations today and issues related to the development of an overall business data analytics organizational strategy. Topics include business data analytics in organizations and its impact on business functional areas, strategic use of data and information, ethical issues related to data collection and usage, social and legal implications of pervasive digitization, and management of intellectual property. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 753. Business Analytics Methods. 2 Credits.

This managerially-oriented course covers the use of analytic tools to generate predictive models such as logistic regression, decision trees, neural networks, and cluster analysis to generate deeper business insights in direct support of managerial decision making. Prereq: Admission in the MBA program or permission of the MBA program coordinator or MBA program director.

MBA 793. Individual Study/Tutorial. 1-5 Credits.**MBA 893. Individual Study/Tutorial. 1-5 Credits.**

Materials & Nanotechnology (MNT)

MNT 729. Materials Characterization. 3 Credits.

This course will cover basic techniques and methods for characterization of materials, x-ray diffraction and electron microscopy will be discussed in detail. Also covered will be spectroscopies, NMR, FTIR and RAMAN.

MNT 730. Nanotechnology and Nanomaterials. 3 Credits.

This course reviews principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology; nanoscale characterization, physics and materials design will be discussed in the context of current engineering applications.

MNT 732. Physical Properties of Materials. 3 Credits.

Describes the fundamental science and engineering concepts that form the foundation of Materials and Nanotechnology, including statistical mechanics, quantum mechanics, condensed matter physics and chemical engineering.

MNT 745. Preparing Future Researchers. 1 Credit.

This course will involve presentations given by invited faculty from various academic institutions ranging from research oriented to teaching oriented and also R&D project leaders in companies.

MNT 756. Molecular Modeling. 3 Credits.

This course will cover basic fundamentals of molecular statics, molecular dynamics, Monte Carlo modeling techniques and allow students to be able to model complex lattice structures, structures of lattice defects, crystal surfaces, and interfaces.

MNT 760. Materials Synthesis Processing. 3 Credits.

This course deals with synthesis and processing issues in materials design.

MNT 790. Graduate Seminar. 1-5 Credits.**MNT 793. Individual Study. 1-5 Credits.****MNT 794. Practicum/Internship. 1-8 Credits.****MNT 798. Master's Thesis. 1-10 Credits.**

Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

MNT 899. Doctoral Dissertation. 1-15 Credits.

Original investigation under the supervision of a major adviser and a supervisory committee. Graded S or U.

Mathematics (MATH)

MATH 098. Intermediate Algebra. 3 Credits.

Properties of the real number system, factoring, linear and quadratic equations, functions, polynomial and rational expressions, inequalities, systems of equations, exponents, and radicals. Offered through Continuing Education. Special fee required. Does not satisfy any requirements for graduation. A grade of C or higher is required in this course to be eligible to take MATH 103 or MATH 104.

MATH 103. College Algebra. 3 Credits.

Relations and functions, equations and inequalities, complex numbers; polynomial, rational, exponential and logarithmic functions; systems of equations, and matrices. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 104. Finite Mathematics. 3 Credits.

Systems of linear equations and inequalities, matrices, linear programming, mathematics of finance, elementary probability and descriptive statistics. Prereq: MATH 98 with a grade of C or higher or placement.

MATH 105. Trigonometry. 3 Credits.

Angle measure, trigonometric and inverse trigonometric functions, trigonometric identities and equations, polar coordinates and applications. Prereq: MATH 103 or placement. Credit awarded only for MATH 105 or MATH 107, not both.

MATH 107. Precalculus. 4 Credits.

Equations and inequalities; polynomial, rational, exponential, logarithmic and trigonometric functions; inverse trigonometric functions; algebraic and trigonometric methods commonly needed in calculus. An expedited, combined offering of MATH 103 and MATH 105. Prereq: Placement into Math 103 and completion of the College Algebra module in eight weeks. Credit awarded only for MATH 105 or MATH 107, not both.

MATH 128. Introduction to Linear Algebra. 1 Credit.

Systems of linear equations, row operations, echelon form, matrix operations, inverses, and determinants. Prereq: MATH 105 or MATH 107. Credit awarded only for MATH 128 or MATH 129, not both.

MATH 129. Basic Linear Algebra. 3 Credits.

Systems of linear equations, matrices, determinants, vector spaces, lines and planes in space, linear transformations, eigenvalues and eigenvectors. Credit awarded only for MATH 128 or MATH 129, not both. Prereq: MATH 105 or MATH 107.

MATH 144. Mathematics for Business. 4 Credits.

Mathematics of finance, linear programming and its applications in business, limits, continuity, derivatives, implicit and logarithmic differentiation, higher order derivatives, optimization and extrema, partial differentiation, extreme values of functions of two variables. Prereq: MATH 103, MATH 107 or placement exam. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 146. Applied Calculus I. 4 Credits.

Limits, derivatives, integrals, exponential and logarithmic functions and applications. Prereq: MATH 103, MATH 107, or placement. Credit awarded only for MATH 144 or MATH 146, not both.

MATH 147. Applied Calculus II. 4 Credits.

Definite integrals, trigonometry, introduction to differential equations, infinite sequences and series, probability and applications. Prereq: MATH 146.

MATH 165. Calculus I. 4 Credits.

Limits, continuity, differentiation, Mean Value Theorem, integration, Fundamental Theorem of Calculus and applications. Prereq: MATH 105 or MATH 107 or placement.

MATH 166. Calculus II. 4 Credits.

Applications and techniques of integration; polar equations; parametric equation; sequences and series, power series. Prereq: MATH 165.

MATH 194. Individual Study. 1-5 Credits.**MATH 196. Field Experience. 1-15 Credits.****MATH 199. Special Topics. 1-5 Credits.****MATH 259. Multivariate Calculus. 3 Credits.**

Functions of several variables, vectors in two and three variables, partial derivatives, surfaces and gradients, tangent planes, differentials, chain rule, optimization, space curves, and multiple integrals. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 265. Calculus III. 4 Credits.

Multivariate and vector calculus including partial derivatives, multiple integration, applications, line and surface integrals, Green's Theorem, Stoke's Theorem, and Divergence Theorem. Prereq: MATH 166. Credit awarded only for MATH 259 or MATH 265, not both.

MATH 266. Introduction to Differential Equations. 3 Credits.

Solution of elementary differential equations by elementary techniques. Laplace transforms, systems of equations, matrix methods, numerical techniques, and applications. Prereq: MATH 259 or MATH 265. Coreq: MATH 128, MATH 129, or MATH 329.

MATH 270. Introduction to Abstract Mathematics. 3 Credits.

Sets, symbolic logic, propositions, quantifiers, methods of proof, relations and functions, equivalence relations, math induction and its equivalents, infinite sets, cardinal numbers, number systems. Prereq: MATH 166.

MATH 291. Seminar. 1-3 Credits.**MATH 294. Individual Study. 1-5 Credits.****MATH 299. Special Topics. 1-5 Credits.****MATH 329. Intermediate Linear Algebra. 3 Credits.**

Vector spaces over real and complex numbers, matrices, determinants, linear transformations, eigenvalues and eigenvectors, Cayley-Hamilton Theorem, inner product spaces, selected topics and applications. Prereq: MATH 129 and MATH 165.

MATH 346. Metric Space Topology. 3 Credits.

Various metrics on Euclidean spaces, metric spaces, open and closed sets, limit points and convergence, Bolzano Weierstrass Theorem, (uniformly) continuous functions, connected spaces, compact spaces and the Heine Borel Theorem, sequence of functions. Prereq: MATH 270.

MATH 374. Special Problems In Mathematics. 1 Credit.

Diverse and challenging mathematical problems are considered with the intent of honing students' problem solving and proof writing skills. Pass/Fail only. Prereq: MATH 270.

MATH 376. Actuarial Exam Study. 1 Credit.

Selected material from calculus, linear algebra, numerical analysis, and other areas that appear on national actuarial exams. May be repeated for credit. Pass/Fail only. Prereq: MATH 266 and MATH 429.

MATH 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MATH 391. Seminar. 1-3 Credits.**MATH 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MATH 394. Individual Study. 1-5 Credits.**MATH 399. Special Topics. 1-5 Credits.****MATH 420. Abstract Algebra I. 3 Credits.**

Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 620.}.

MATH 421. Abstract Algebra II. 3 Credits.

Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 420. {Also offered for graduate credit - see MATH 621.}.

MATH 429. Topics in Linear Algebra. 3 Credits.

Advanced topics in linear algebra with a focus on understanding the theoretical foundation of the subject and its uses in advanced mathematics. Topics may vary. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 629.}.

MATH 430. Graph Theory. 3 Credits.

Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. Prereq: MATH 270. {Also offered for graduate credit - see MATH 630.}.

MATH 436. Combinatorics. 3 Credits.

Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. Prereq: MATH 270. {Also offered for graduate credit - see MATH 636.}.

MATH 439. Topics in Algebra and Discrete Mathematics. 3 Credits.

Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. Prereq: MATH 420 or MATH 430 or MATH 436. {Also offered for graduate credit - See MATH 639}.

MATH 440. Axiomatic Geometry. 3 Credits.

Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. Prereq: MATH 270. {Also offered for graduate credit - see MATH 640.}.

MATH 442. Introduction to Topology. 3 Credits.

Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. Prereq: MATH 346. {Also offered for graduate credit - see MATH 642.}.

MATH 443. Differential Geometry. 3 Credits.

Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. Prereq: MATH 265 and MATH 346. {Also offered for graduate credit - see MATH 643.}.

MATH 449. Topics in Topology and Geometry. 3 Credits.

Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. Prereq: MATH 442 or MATH 443. {Also offered for graduate credit - See MATH 649}.

MATH 450. Real Analysis I. 3 Credits.

Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. Prereq: MATH 346. {Also offered for graduate credit - see MATH 650.}.

MATH 452. Complex Analysis. 3 Credits.

Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. Prereq: MATH 265 and MATH 270. {Also offered for graduate credit - see MATH 652.}.

MATH 453. Introduction to Lebesgue Measure. 3 Credits.

Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to L_p spaces. Prereq: MATH 450. {Also offered for graduate credit - see MATH 653}.

MATH 454. Introduction to Functional Analysis. 3 Credits.

Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequence spaces. Prereq: MATH 346. {Also offered for graduate credit - See MATH 654}.

MATH 459. Topics in Analysis. 3 Credits.

Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. Prereq: MATH 450. {Also offered for graduate credit - See MATH 659.}.

MATH 460. Mathematical Software. 1 Credit.

An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. Prereq: MATH 259 or MATH 265. {Also offered for graduate credit - see MATH 660.}.

MATH 472. Number Theory. 3 Credits.

Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. Prereq: MATH 270. {Also offered for graduate credit - see MATH 672.}.

MATH 473. Cryptology. 3 Credits.

Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. Prereq: MATH 270 and MATH 329. {Also offered for graduate credit - see MATH 673.}.

MATH 476. Actuary Exam Study. 1 Credit.

Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with STAT.

MATH 478. History of Mathematics. 3 Credits.

Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. Prereq: MATH 270. {Also offered for graduate credit - see MATH 678.}.

MATH 480. Applied Differential Equations. 3 Credits.

Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. Prereq: MATH 266. {Also offered for graduate credit - see MATH 680.}.

MATH 481. Fourier Analysis. 3 Credits.

Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. Prereq: MATH 265. {Also offered for graduate credit - see MATH 681.}.

MATH 483. Partial Differential Equations. 3 Credits.

First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. Prereq: MATH 266 and either MATH 270 or MATH 329. {Also offered for graduate credit - see MATH 683.}.

MATH 484. Mathematical Methods of Biological Processes. 3 Credits.

This course provides an introduction to mathematical methods in biology. Prereq: MATH 266. {Also offered for graduate credit - see MATH 684.}.

MATH 485. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. Prereq: MATH 483. {Also offered for graduate credit - See MATH 685.}.

MATH 488. Numerical Analysis. 3 Credits.

Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. Prereq: MATH 266. {Also offered for graduate credit - see MATH 688.}.

MATH 491. Seminar. 1-5 Credits.**MATH 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MATH 493. Undergraduate Research. 1-5 Credits.**MATH 494. Individual Study. 1-5 Credits.****MATH 496. Field Experience. 1-15 Credits.****MATH 499. Special Topics. 1-5 Credits.****MATH 620. Abstract Algebra I. 3 Credits.**

Groups, permutations, quotient groups, homomorphisms, rings, ideals, integers. {Also offered for undergraduate credit - see MATH 420.}.

MATH 621. Abstract Algebra II. 3 Credits.

Division rings, integral domains, fields, field extensions, Galois Theory. Prereq: MATH 620. {Also offered for undergraduate credit - see MATH 421.}.

MATH 629. Topics in Linear Algebra. 3 Credits.

Advanced topics in linear algebra with a focus on understanding the theoretical foundation of the subject and its uses in advanced mathematics. Topics may vary. {Also offered for undergraduate credit - see MATH 429.}.

MATH 630. Graph Theory. 3 Credits.

Graphs and directed graphs, graph models, subgraphs, isomorphisms, paths, connectivity, trees, networks, cycles, circuits, planarity, Euler's formula, matchings, bipartite graphs, colorings, and selected advanced topics. {Also offered for undergraduate credit - see MATH 430.}.

MATH 636. Combinatorics. 3 Credits.

Recurrence relations, formal power series, generating functions, exponential generating functions, enumeration, binomial coefficients and identities, hypergeometric functions, Ramsey theory, Sterling and Eulerian numbers. {Also offered for undergraduate credit - see MATH 436.}.

MATH 639. Topics in Algebra and Discrete Mathematics. 3 Credits.

Advanced topics in algebra and discrete mathematics. Topics may vary but may include: algebraic geometry, factorization, partially ordered sets, and/or coding theory. {Also offered for undergraduate credit. See MATH 439.}.

MATH 640. Axiomatic Geometry. 3 Credits.

Hilbert's axioms for Euclidean geometry, projective geometry, history of parallel axiom, hyperbolic geometry, elliptic geometry. {Also offered for undergraduate credit - see MATH 440.}.

MATH 642. Introduction to Topology. 3 Credits.

Basic Point-Set Topology: Topological Spaces, Open/Closed Sets, Continuity, Connectedness, Compactness; Surfaces: Classification, Basic Invariants; Introduction to Homology; Applications: Brouwer's Fix-Point Theorem, Ham and Sandwich Theorem. {Also offered for undergraduate credit - see MATH 442.}.

MATH 643. Differential Geometry. 3 Credits.

Local and global geometry of plane curves, local geometry of hypersurfaces, global geometry of hypersurfaces, geometry of lengths and distances. {Also offered for undergraduate credit - see MATH 443.}.

MATH 649. Topics in Topology and Geometry. 3 Credits.

Topics will vary and may include: Riemannian Geometry, Symplectic Topology, Dynamical Systems on Manifolds, Hamiltonian Systems, Geometric Group Theory, Descriptive Set Theory. {Also offered for undergraduate credit - See MATH 449.}.

MATH 650. Real Analysis I. 3 Credits.

Differentiation and Riemann integration in the real numbers. Sequences and series of functions; uniform convergence and power series. {Also offered for undergraduate credit - see MATH 450.}.

MATH 652. Complex Analysis. 3 Credits.

Complex number systems, analytic and harmonic functions, elementary conformal mapping, integral theorems, power series, Laurent series, residue theorem, and contour integral. {Also offered for undergraduate credit - see MATH 452.}.

MATH 653. Introduction to Lebesgue Measure. 3 Credits.

Definition of Lebesgue measure. Measurable and Lebesgue integrable functions. Introduction to L_p spaces. {Also offered for undergraduate credit - see MATH 453.}.

MATH 654. Introduction to Functional Analysis. 3 Credits.

Functional analysis in sequence spaces. Standard sequence spaces and dual spaces. Hahn-Banach Theorem. Operators on sequence spaces. {Also offered for undergraduate credit - See MATH 454.}.

MATH 659. Topics in Analysis. 3 Credits.

Topics will vary and may include: Harmonic Analysis, Dynamical Systems, Fractals, Distribution Theory, and Approximation Theory. {Also offered for undergraduate credit - See MATH 459.}.

MATH 660. Mathematical Software. 1 Credit.

An overview of a mathematical software system, with a focus on its utility in mathematical problems. Possible software systems may include: Mathematica, SAGE, or similar programs. May be repeated for credit with a different software. {Also offered for undergraduate credit - see MATH 460.}.

MATH 672. Number Theory. 3 Credits.

Properties of integers, number theoretic functions, quadratic residues, continued fractions, prime numbers and their distribution, primitive roots. {Also offered for undergraduate credit - see MATH 472.}.

MATH 673. Cryptology. 3 Credits.

Cryptography and cryptanalysis of ciphers. Discrete logarithms, Diffie-Hellman key exchange, the RSA cryptosystem, elliptic curve cryptography, and selected topics. {Also offered for undergraduate credit - see MATH 473.}.

MATH 678. History of Mathematics. 3 Credits.

Historical considerations emphasizing the source of mathematical ideas, growth of mathematical knowledge, and contributions of some outstanding mathematicians. {Also offered for undergraduate credit - see MATH 478.}.

MATH 680. Applied Differential Equations. 3 Credits.

Method of power series and method of Frobenius, oscillation theorems, special functions (Bessel functions and Legendre functions), linear systems including the exponential matrix. Sturm-Liouville and phase plane analysis as time permits. {Also offered for undergraduate credit - see MATH 480.}.

MATH 681. Fourier Analysis. 3 Credits.

Discrete and continuous Fourier transforms, Fourier series, convergence and inversion theorems, mean square approximation and completeness, Poisson summation, Fast-Fourier transform. {Also offered for undergraduate credit - see MATH 481.}.

MATH 683. Partial Differential Equations. 3 Credits.

First and second order partial differential equations, classification, examples, solution methods for the wave, diffusion, and Laplace equations, causality and energy, boundary value problems, separation of variables, Green's identities, Green's functions. {Also offered for undergraduate credit - see MATH 483.}.

MATH 684. Mathematical Methods of Biological Processes. 3 Credits.

This course provides an introduction to mathematical methods in biology. {Also offered for undergraduate credit - see MATH 484.}.

MATH 685. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Models in Biology and Finance, Network Theory, Calculus of Variation, Stochastic Calculus, Integral Transforms, Control Theory, and Parameter Estimation. {Also offered for undergraduate credit - See MATH 485.}.

MATH 688. Numerical Analysis. 3 Credits.

Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations. {Also offered for undergraduate credit - see MATH 488.}.

MATH 690. Graduate Seminar. 1-3 Credits.**MATH 696. Special Topics. 1-5 Credits.****MATH 720. Algebra I. 3 Credits.**

Graduate level survey of algebra: rings, modules, linear algebra and selected advanced topics. Prereq: MATH 621.

MATH 721. Algebra II. 3 Credits.

Graduate level survey of algebra: groups, fields, Galois theory, and selected advanced topics. Prereq: MATH 720.

MATH 726. Homological Algebra. 3 Credits.

An overview of the techniques of homological algebra. Topics covered will include categories and functors, exact sequences, (co)chain complexes, Mayer-Vietoris sequences, TOR and EXT. Applications to other fields will be stressed. Prereq: MATH 720.

MATH 732. Introduction to Bioinformatics. 3 Credits.

An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with CSCI 732 and STAT 732.

MATH 736. Enumerative Combinatorics. 3 Credits.

Combinatorial enumeration, generating functions, inversion formulae, formal power series, and selected advanced topics. Prereq: MATH 636.

MATH 737. Algebraic Combinatorics. 3 Credits.

Posets, distributive lattices, tableaux dynamics, symmetric functions, representation theory, and selected advanced topics. Prereq: MATH 636.

MATH 746. Topology I. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 747. Topology II. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizability, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 642.

MATH 750. Analysis. 3 Credits.

Lebesgue and general measure and integration theory, differentiation, product spaces, metric spaces, elements of classical Banach spaces, Hilbert spaces, and selected advanced topics. Prereq: MATH 650.

MATH 752. Complex Analysis. 3 Credits.

Analytic and harmonic functions, power series, conformal mapping, contour integration and the calculus of residues, analytic continuation, meromorphic and entire functions, and selected topics. Prereq: MATH 652.

MATH 754. Functional Analysis. 3 Credits.

Normed spaces, linear maps, Hahn-Banach Theorem and other fundamental theorems, conjugate spaces and weak topology, adjoint operators, Hilbert spaces, spectral theory, and selected topics. Prereq: MATH 750.

MATH 756. Harmonic Analysis. 3 Credits.

A survey of Harmonic analysis including: L_p spaces; Fourier Series; Fourier transform; Hilbert transform; and special selected topics. Prereq: MATH 750.

MATH 760. Ordinary Differential Equations I. 3 Credits.

Existence, uniqueness, and extensibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, and selected advanced topics. Prereq: MATH 650 or MATH 680.

MATH 782. Mathematical Methods in Physics I. 3 Credits.

Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with PHYS 752.

MATH 783. Mathematical Methods in Physics II. 3 Credits.

Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with PHYS 753.

MATH 784. Partial Differential Equations I. 3 Credits.

Classification in elliptic, parabolic, hyperbolic type; existence and uniqueness for second order equations; Green's functions, and integral representations; characteristics, nonlinear phenomena. Prereq: MATH 650 or MATH 683.

MATH 790. Graduate Seminar. 1-3 Credits.**MATH 791. Temporary/Trial Topics. 1-5 Credits.****MATH 793. Individual Study/Tutorial. 1-5 Credits.****MATH 794. Practicum/Internship. 1-8 Credits.****MATH 796. Special Topics. 1-5 Credits.****MATH 797. Master's Paper. 1-3 Credits.****MATH 798. Master's Thesis. 1-10 Credits.****MATH 810. Research in the Teaching of University Mathematics. 3 Credits.**

This course will cover fundamental topics in mathematics education research including: research design, fundamental research areas, and the interconnection between research and classroom practices.

MATH 824. Topics in Commutative Algebra. 3 Credits.

Topics vary each time the course is offered and may include: dimension theory, integral dependence, factorization, regular rings, Cohen-Macaulay rings, Gorenstein rings. May be repeated for credit with change in subtopic. Prereq: MATH 720.

MATH 825. Theory Of Rings. 3 Credits.

The ideal theory of commutative rings, structure of (non-commutative) rings, and selected advanced topics. Prereq: MATH 720.

MATH 830. Graph Theory. 3 Credits.

Graduate-level survey of graph theory: paths, connectivity, trees, cycles, planarity, genus, Eulerian graphs, Hamiltonian graphs, factorizations, tournaments, embedding, isomorphism, subgraphs, colorings, Ramsey theory, girth. Prereq: MATH 630.

MATH 839. Topics in Combinatorics and Discrete Mathematics. 3 Credits.

Selected topics in combinatorics and discrete mathematics. Topics vary each time the course is offered and may include: symmetric functions, Coxeter theory, geometric combinatorics of polytopes, computational combinatorics, statistical mechanics and combinatorics, or dynamical algebraic combinatorics.

MATH 849. Topics in Geometry & Topology. 3 Credits.

Advanced topics in Geometry and/or Topology. Topics vary but may include: differential geometry, K-theory, knot theory, or noncommutative geometry. May be repeated for credit with change in subtopic. Prereq: MATH 642, MATH 643.

MATH 856. Dynamical Systems. 3 Credits.

A study of basic notions of topological and symbolic dynamics. Introduction to measurable dynamics and ergodic theory. Ergodicity, mixing and entropy of dynamical systems. Prereq: MATH 750.

MATH 857. Topics in Functional Analysis. 3 Credits.

Maximal monotone operators and the Hille-Yosida theorem, Sobolev spaces in dimension one and applications, Sobolev spaces in higher dimensions, extension operators, Sobolev embedding theorems, Poincare inequality, duality. May be repeated for credit with change in subtopic. Prereq: MATH 750. Co-req: MATH 751.

MATH 861. Ordinary Differential Equations II. 3 Credits.

Existence, uniqueness, and extendibility of solutions to initial value problems, linear systems, stability, oscillation, boundary value problems, difference equations, and selected advanced topics. Prereq: MATH 760.

MATH 862. Integral Equations. 3 Credits.

Existence and uniqueness of solutions of Fredholm and Volterra integral equations, Fredholm Theory, singular integral equations, and selected advanced topics. Prereq: MATH 650.

MATH 864. Calculus Of Variations. 3 Credits.

Variational techniques of optimization of functionals, conditions of Euler, Weierstrass, Legendre, Jacobi, Erdmann, Pontryagin Maximal Principle, applications, and selected advanced topics. Prereq: MATH 650.

MATH 867. Topics in Applied Mathematics. 3 Credits.

Topics will vary and may include: Optimal Control, Robust Control, Stability Analysis, Mathematics of Networks, Models in Biology, Levy Processes, Asymptotic Expansions. May be repeated for credit with change in subtopic. Prereq: MATH 650 or MATH 680.

MATH 878. Modern Probability Theory. 3 Credits.

Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with STAT 778.

MATH 880. Methods of Optimization. 3 Credits.

Elements of convex analysis, constrained and unconstrained multi-dimensional linear and nonlinear optimization theory and algorithms, convergence properties and computational complexity. Prereq: CSCI 653. Cross-listed with CSCI 880.

MATH 881. Mathematical Control Theory. 3 Credits.

Standard optimal control and optimal estimation problems; duality; optimization in Hardy space; robust control design. Prereq: MATH 650.

MATH 885. Partial Differential Equations II. 3 Credits.

Nonlinear partial differential equations, Non-variational techniques, Hamilton-Jacobi equations, Riemann invariants, Entropy/entropy-flux pairs, selected advanced topics. Prereq: MATH 784.

MATH 888. Numerical Analysis. 3 Credits.

Numerical solutions to partial differential and integral equations, error analysis, stability, acceleration of convergence, numerical approximation, and selected advanced topics. Prereq: MATH 688.

MATH 893. Individual Study/Tutorial. 1-5 Credits.**MATH 899. Doctoral Dissertation. 1-15 Credits.**

Mechanical Engineering (ME)

ME 111. Introduction to Mechanical Engineering. 2 Credits.

This course introduces students to the field of mechanical engineering, the Mechanical Engineering degree program at NDSU, and potential career opportunities in the discipline through the use of hands-on, project-based learning experiences in multi-member teams addressing traditional and newly emerging topics in the field of mechanical engineering, including computer aided design, solid mechanics, fluid dynamics, thermodynamics, materials selection, instrumentation and data analysis in the context of problem-solving and design. Prereq: Acceptance into the Pre-Professional Mechanical Engineering program.

ME 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation. Cross-listed with ABEN 189, AGRI 189, BUSN 189, HD&E 189 and UNIV 189. F, S.

ME 194. Individual Study. 1-5 Credits.**ME 196. Field Experience. 1-15 Credits.****ME 199. Special Topics. 1-5 Credits.****ME 212. Fundamentals of Visual Communication for Engineers. 3 Credits.**

Visual communications for design and manufacturing, computer-aided drawing and design, three-dimensional modeling and orthographic projections, geometric dimensioning and tolerancing, ASME Y14.5 1994 standard, sketching, parametric modeling, drawings and assemblies. F, S.

ME 213. Modeling of Engineering Systems. 3 Credits.

Introduction to numerical methods used in the solution of engineering problems; computer methods, programming, and graphics; engineering system modeling and simulation; case studies. Prereq: MATH 128 or MATH 129, ME 222. Coreq: MATH 266.

ME 221. Engineering Mechanics I. 3 Credits.

Scalar and vector approaches to trusses, frames and machines, internal forces, friction forces, center of gravity, centroid, and moment inertia. Prereq: MATH 165.

ME 222. Engineering Mechanics II. 3 Credits.

Dynamics of particles and rigid bodies, work energy, impulse-momentum, principles of conservation of energy and momentum. Prereq: ME 221, MATH 166.

ME 223. Mechanics of Materials. 3 Credits.

Introduction to stress, strain, and their relationships; torsion of circular shafts, bending stresses, deflection of beams, stress transformations. Prereq: ME 221.

ME 291. Seminar. 1-3 Credits.**ME 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 294. Individual Study. 1-5 Credits.**ME 299. Special Topics. 1-5 Credits.****ME 311. Introduction To Aviation. 3 Credits.**

General introduction to aviation and preparation for FAA examination for Private Pilot License, study of FAA regulations, weather conditions, visual and radio navigation. F, S.

ME 312. Introduction to Flight. 2 Credits.

Instruction in flight procedures, operation of aircraft, and introduction to solo flight. Completion of 15 hours of dual flight instruction required. Coreq: ME 311. F, S.

ME 313. Commercial Instrument Ground School. 3 Credits.

Preparation of student for FAA written examination for Commercial Certificate and Instrument Rating License; study of commercial flight maneuvers and instrument flying and procedures. Prereq: ME 311 or holder of private pilot license. On demand.

ME 331. Materials Science and Engineering. 4 Credits.

Characterization of microscopic structures and associated macroscopic properties and performance of mechanical engineering design materials (metals, ceramics, plastics) and processing effects. Includes laboratory. Includes laboratory. Prereq: CHEM 122, ME 223 and admission to professional program.

ME 332. Engineering Materials II. 3 Credits.

Characterization of properties and processes in metals; diffusion, phase diagrams, phase transformation, creep, wear, corrosion, fracture, and fatigue. Prereq: ME 331 and admission to professional program. S.

ME 350. Thermodynamics and Heat Transfer. 3 Credits.

Basic concepts, first and second laws of thermodynamics; introduction to heat transfer principles. Prereq: ME 222 or equivalent. For non-mechanical engineering majors.

ME 351. Thermodynamics I. 3 Credits.

Basic concepts, properties of pure substances and ideal gases. First and second law, entropy. Prereq: ME 222, MATH 259.

ME 352. Fluid Dynamics. 3 Credits.

Foundations of the science of fluid dynamics. Basic concepts including thermodynamic principles applied to fluids. Development of conservation principles and applications. Prereq: ME 351 and admission to professional program.

ME 353. Thermodynamics II. 3 Credits.

Continuation of Thermodynamics I. Cycle analysis, thermodynamic relations, mixtures, chemical reactions, and related topics. Prereq: ME 351 and admission to professional program.

ME 361. Product Design and Development. 3 Credits.

This course provides an insight into the mechanical design process with the focus on developing a new product with thoughtful implementation of human-centered design (robust design, design for environment, human factors, etc.). Topics on project planning and scheduling and conceptual design process will be covered. In addition, this course provides students with an introduction into the business aspects of project management and product development. Prereq: Admission to the professional program.

ME 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

ME 391. Seminar. 1-3 Credits.**ME 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 394. Individual Study. 1-5 Credits.**ME 397. Fe/Coop Ed/Internship. 1-4 Credits.****ME 399. Special Topics. 1-5 Credits.****ME 412. Engineering Measurements. 3 Credits.**

Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. Prereq: ECE 306, ME 213 and admission to professional program. {Also offered for graduate credit - see ME 612.}.

ME 421. Theory of Vibrations. 3 Credits.

Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. Prereq: ME 213, MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 621.}.

ME 435. Plastics and Polymer Processing in Manufacturing. 3 Credits.

Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Prereq: MATH 266. Cross-listed with IME 435. {Also offered for graduate credit - see ME 635.}.

ME 436. Biopolymers and Biocomposites. 3 Credits.

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for undergraduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Prereq: CHEM 122 and at least junior standing. Cross-listed with CHEM 436 and CPM 436. {Also offered for graduate credit - See ME 636.}.

ME 437. Engineering Ceramics. 3 Credits.

Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectric, and thermo-mechanical properties. Prereq: ME 223, ME 331 and admission to the ME professional program.

ME 442. Machine Design I. 3 Credits.

Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. Prereq: Admission to professional program. Co-req: ME 331. {Also offered for graduate credit - see ME 642.}.

ME 443. Machine Design II. 3 Credits.

Application of methods, procedures, and standards used in the design and selection of mechanical components and elements, including springs, roller and journal bearings, gears, brakes, belts and flexible elements. Prereq: ME 442 and admission to the professional ME program. {Also offered for graduate credit - see ME 643.}.

ME 454. Heat and Mass Transfer. 3 Credits.

Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. Prereq: ME 213, ME 352, MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 654.}.

ME 457. Thermal Systems Laboratory. 3 Credits.

Investigation of thermal, fluid and mechanical systems and instrumentations. Statistical methods are used in data collection and analysis. Prereq: Admission to professional program. Co-req: ME 454.

ME 461. Design Project I. 3 Credits.

Capstone student project in design, analysis, and experimental investigation in mechanical engineering. Prereq: ME 361. Coreq: ME 443, ME 454, Senior standing in ME. Prereq: admission to professional program.

ME 462. Design Project II. 3 Credits.

Capstone student project in design, analysis, and experimental investigation in mechanical engineering. Prereq: ME 461 and admission to professional program.

ME 468. Introduction to Biomechanics. 3 Credits.

Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies; stress and strain, transport phenomena, and viscoelasticity, as well as their applications on the biomechanics of soft and hard tissues. Prereq: ME 223 and ME 352 and admission to the professional ME program. {Also offered for graduate credit - see ME 668.}.

ME 470. Renewable Energy Technology. 3 Credits.

Introduction to renewable energy technology, solar thermal energy systems, solar photovoltaic systems, wind turbines; biomass; bio-fuels; urban waste to energy from pyrolysis plants; hydrogen energy and fuel cells. Prereq: ME 350 or ME 351 and admission to the ME professional program. {Also offered for graduate credit - see ME 670.}.

ME 471. Experimental Stress Analysis. 3 Credits.

Introduction to experimental techniques for the measurement of stresses and strains, including strain gages, optical methods, photoelasticity, and brittle coatings. Prereq: ME 442 and admission to professional program. {Also offered for graduate credit - see ME 671.}.

ME 472. Fatigue and Fracture of Metals. 3 Credits.

Causes and effects of fatigue failure and fracture of metals, analytical methods for fatigue design and fatigue life prediction, fatigue crack initiation and propagation, fatigue testing and validation. Prereq: ME 442 and admission to professional program. {Also offered for graduate credit - see ME 672.}.

ME 473. Engineering with Polymeric Materials. 3 Credits.

This course will introduce basic polymer materials including plastics, rubbers, adhesives; structures, properties, and relationships of polymers; additives; processing technologies, applications and development. Prereq: ME 331 and admission to professional program. {Also offered for graduate credit - see ME 673.}.

ME 474. Mechanics of Composite Materials. 3 Credits.

Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. Prereq: ME 331 and admission to professional program. {Also offered for graduate credit - see ME 674.}.

ME 475. Automatic Controls. 3 Credits.

Introduction to industrial automatic controls. Theory and applications of pneumatic control, continuous process control, and programmable logic control. Demonstrations and discussion of the current industrial practice. Prereq: MATH 266 and admission to professional program. {Also offered for graduate credit - see ME 675.}.

ME 476. Mechatronics. 3 Credits.

Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. Prereq: ECE 301 or ECE 311 and admission to the professional program. {Also offered for graduate credit - see ME 676.}.

ME 477. ME Finite Element Analysis. 3 Credits.

Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. Prereq: ME 442 and ME 213 or ABEN 255 and admission to professional program. {Also offered for graduate credit - see ME 677.}.

ME 478. Advanced Flow Diagnostics. 3 Credits.

Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. Prereq: ME 352 and admission to the professional program in Mechanical Engineering. {Also offered for graduate credit - See ME 678.}.

ME 479. Fluid Power Systems Design. 3 Credits.

Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. Prereq: ME 352 and admission to professional program. Cross-listed with ABEN 479. {Also offered for graduate credit - see ME 679.}.

ME 480. Biofluid Mechanics. 3 Credits.

Overview of fluid dynamical phenomena in biological systems; flow behavior of fluids in living organisms; application of fluid mechanics to the cardiovascular system and blood circulation. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 680.}.

ME 481. Fundamentals of Energy Conversion. 3 Credits.

Introduction to electric power generating systems and their major components such as turbines, boilers, condensers, and cooling towers. Prereq: ME 351 and admission to professional program. {Also offered for graduate credit - see ME 681.}.

ME 483. Introduction to Computational Fluid Dynamics. 3 Credits.

Introduction to the methods and analysis techniques used in numerical solutions of fluid flow, heat and mass transfer problems of practical engineering interest. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 683.}.

ME 484. Gas Turbines. 3 Credits.

Theory and design of gas turbines and components. Prereq: ME 454 and admission to professional program. {Also offered for graduate credit - see ME 684.}.

ME 485. Heating, Ventilation and Air Conditioning. 3 Credits.

Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. Prereq: ME 352 and admission to professional program. {Also offered for graduate credit - see ME 685.}.

ME 486. Nanotechnology and Nanomaterials. 3 Credits.

This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. Prereq: Senior standing in Engineering or Sciences. Cross-listed with CE 486. {Also offered for graduate credit - see ME 686.}.

ME 487. Internal Combustion Engines. 3 Credits.

Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines are included along with hybrid systems. Prereq: ME 351 and admission to professional program. {Also offered for graduate credit - see ME 687.}.

ME 488. Introduction to Aerodynamics. 3 Credits.

Introductory aerodynamics, aerodynamic characteristics of airfoils, and other components subjected to inviscid-incompressible flows; dynamics of compressible fluids; shock waves, one-dimensional flow, expansion waves in two-dimensional flow, and compressible flow over aerodynamic bodies. Prereq: ME 352 and admission to professional program or graduate standing. {Also offered for graduate credit - see ME 688.}.

ME 489. Vehicle Dynamics. 3 Credits.

Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. Prereq: ME 222 and admission to professional program. {Also offered for graduate credit - see ME 689.}.

ME 491. Seminar. 1-5 Credits.**ME 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

ME 494. Individual Study. 1-5 Credits.**ME 496. Field Experience. 1-15 Credits.****ME 499. Special Topics. 1-5 Credits.****ME 612. Engineering Measurements. 3 Credits.**

Principles and characteristics of instruments used for engineering measurements, statistical analysis of data, signal conditioning, data acquisition systems. Includes laboratory. {Also offered for undergraduate credit - see ME 412.}.

ME 621. Theory of Vibrations. 3 Credits.

Fundamentals of vibrations; free, forced, and damped vibration of single and multiple degrees of freedom systems. {Also offered for undergraduate credit - see ME 421.}.

ME 635. Plastics and Injection Molding Manufacturing. 3 Credits.

Product and process engineering for manufacturers of plastic products; material evaluation and selection, mold design, process design, quality evaluation of manufactured plastic parts. Cross-listed with IME 635. {Also offered for undergraduate credit - see ME 435.}.

ME 636. Biopolymers and Biocomposites. 3 Credits.

Structure/properties/synthesis of biopolymers, biomaterials and engineered biocomposites derived from plant based materials. An interdisciplinary course designed for graduate students. Introduction to science and engineering of converting biorenewable resources into novel biobased materials and products. Introduction to principles and concepts critical to successful design of polymeric biomaterials, coatings, and biocomposites. Understanding environmental impacts through life cycle analysis (LCA). Restrictions: A junior standing student can register if accepted to an accelerated graduate program. Cross-listed with CHEM 636 and CPM 636. {Also offered for undergraduate credit - See ME 436.}.

ME 637. Engineering Ceramics. 3 Credits.

Study the crystal and defect structures to determine the electrical and mass transport behaviors in ceramic materials. Investigation on microstructure of ceramic materials and its effect on optical, magnetic, dielectric, and thermo-mechanical properties. {Also offered for undergraduate credit - see ME 437.}.

ME 642. Machine Design I. 3 Credits.

Application of engineering mechanics, material properties, and failure theories to the design of reliable machine components. {Also offered for undergraduate credit - see ME 442.}.

ME 643. Machine Design II. 3 Credits.

Application of methods, procedures, and standards used in the design and selection of mechanical components and elements, including springs, roller and journal bearings, gears, brakes, belts and flexible elements. {Also offered for undergraduate credit - see ME 443.}.

ME 654. Heat and Mass Transfer. 3 Credits.

Principles of heat transfer by conduction, convection, and radiation. Introduction to mass transfer principles. {Also offered for undergraduate credit - see ME 454.}.

ME 668. Introduction to Biomechanics. 3 Credits.

Introduction to the fundamentals of biomechanics including force analysis, mechanics of deformable bodies; stress and strain, transport phenomena, and viscoelasticity, as well as their applications on the biomechanics of soft and hard tissues. {Also offered for undergraduate credit - see ME 468.}.

ME 670. Renewable Energy Technology. 3 Credits.

Introduction to renewable energy technology, solar thermal energy systems, solar photovoltaic systems, wind turbines; biomass; bio-fuels; urban waste to energy from pyrolysis plants; hydrogen energy and fuel cells. {Also offered for undergraduate credit - see ME 470.}.

ME 671. Experimental Stress Analysis. 3 Credits.

Introduction to experimental techniques for the measurement of stresses and strains, including strain gages, optical methods, photoelasticity, and brittle coatings. {Also offered for undergraduate credit - see ME 471.}.

ME 672. Fatigue and Fracture of Metals. 3 Credits.

Causes and effects of fatigue failure and fracture of metals, analytical methods for fatigue design and fatigue life prediction, fatigue crack initiation and propagation, fatigue testing and validation. {Also offered for undergraduate credit - see ME 472.}.

ME 673. Polymer Engineering. 3 Credits.

This course will introduce basic polymer materials including plastics, rubbers, adhesives; structures, properties, and relationships of polymers; additives; processing technologies, applications and development. {Also offered for undergraduate credit - see ME 473.}.

ME 674. Mechanics of Composite Materials. 3 Credits.

Materials, properties, stress, and strength analyses; engineering design and manufacturing aspects of short and continuous fiber-reinforced materials. {Also offered for undergraduate credit - see ME 474.}.

ME 675. Automatic Controls. 3 Credits.

Introduction to industrial automatic controls. Theory and applications of pneumatic control, continuous process control, and programmable logic control. Demonstrations and discussion of the current industrial practice. {Also offered for undergraduate credit - see ME 475.}.

ME 676. Mechatronics. 3 Credits.

Design and development of mechatronic systems that require an integrated knowledge of mechanical engineering, electronics, computer science and control theory. {Also offered for undergraduate credit - see ME 476.}.

ME 677. ME Finite Element Analysis. 3 Credits.

Introduction to the finite element method and its application to problems in mechanical engineering, including stress analysis. {Also offered for undergraduate credit - see ME 477.}.

ME 678. Advanced Flow Diagnostics. 3 Credits.

Introduction and review of fundamentals of advanced thermal and fluid measurement techniques for engineering applications including advanced laser and optical diagnostics, high speed imaging, infrared thermography, fiber optics, fluorescence, etc. {Also offered for undergraduate credit - See ME 478.}.

ME 679. Fluid Power Systems Design. 3 Credits.

Fluid dynamics principles and fluid properties are applied to the study of function, performance, and design of system components and systems for power transmission and control purposes. {Also offered for undergraduate credit - see ME 479.}.

ME 680. Biofluid Mechanics. 3 Credits.

Overview of fluid dynamical phenomena in biological systems; flow behavior of fluids in living organisms; application of fluid mechanics to the cardiovascular system and blood circulation. {Also offered for undergraduate credit - see ME 480.}.

ME 681. Fundamentals of Energy Conversion. 3 Credits.

Introduction to electric power generating systems and their major components such as turbines, boilers, condensers, and cooling towers. {Also offered for undergraduate credit - see ME 481.}.

ME 683. Introduction to Computational Fluid Dynamics. 3 Credits.

Introduction to the methods and analysis techniques used in numerical solutions of fluid flow, heat and mass transfer problems of practical engineering interest. {Also offered for undergraduate credit - see ME 483.}.

ME 684. Gas Turbines. 3 Credits.

Theory and design of gas turbines and components. Prereq: ME 654. {Also offered for undergraduate credit - see ME 484.}.

ME 685. Heating, Ventilation and Air Conditioning. 3 Credits.

Application of the basic fundamentals of thermodynamics, heat transfer, and fluid flow to heating, ventilating, and air conditioning. {Also offered for undergraduate credit - see ME 485.}.

ME 686. Nanotechnology and Nanomaterials. 3 Credits.

This course covers principles of nanotechnology, nanomaterials and develops a framework for their understanding. The basic tools of nanotechnology: nanoscale characterization, physics and materials design will be discussed in the context of current technological advances. {Also offered for undergraduate credit - see ME 486.}.

ME 687. Internal Combustion Engines. 3 Credits.

Theory and practice of power and propulsion engines utilizing gas as a working substance. Study of gas turbines, spark, and compression ignition engines. {Also offered for undergraduate credit - see ME 487.}.

ME 688. Introduction to Aerodynamics. 3 Credits.

Introductory aerodynamics, aerodynamic characteristics of airfoils, and other components subjected to inviscid-incompressible flows; dynamics of compressible fluids; shock waves, one-dimensional flow, expansion waves in two-dimensional flow, and compressible flow over aerodynamic bodies. {Also offered for undergraduate credit - see ME 488.}.

ME 689. Vehicle Dynamics. 3 Credits.

Fundamental science and engineering underlying the design and operation of vehicles. Use of previous knowledge of statics, kinematics, dynamics, and machine design. {Also offered for undergraduate credit - see ME 489.}.

ME 690. Graduate Seminar. 1-3 Credits.**ME 696. Special Topics. 1-5 Credits.****ME 711. Advanced Engineering Analysis. 3 Credits.**

Mathematical analysis and numerical treatment of engineering problems, eigenvalue problems in lumped and distributed parameter systems, advanced mathematics applied to engineering design.

ME 712. Advanced Finite Element Analysis. 3 Credits.

Application of finite element methods to problems of plasticity, viscoplasticity, fracture, vibrations, fluids, material and geometric non-linearity, and heat transfer. Recommended: ME 677.

ME 717. Advanced Controls for Mechanical Systems. 3 Credits.

Analysis and design of multivariable control systems for robust stabilization and optimal performance of mechanical systems.

ME 720. Continuum Mechanics. 3 Credits.

Tensor analysis in affine and metric spaces, kinematics of motion, general principles of continuum mechanics and postulates on constitutive laws. Two 75-minute lectures. Cross-listed with CE 720.

ME 721. Advanced Dynamics. 3 Credits.

Newtonian dynamics; dynamics of particles; dynamics of rigid bodies; multi-body dynamics; variational principles; principle of virtual work; d'Alembert's principle; Hamilton's principle; Lagrange's equation of motion; kinematics of rigid bodies; solutions of nonholonomic equations of motion.

ME 722. Advanced Mechanics of Materials. 3 Credits.

Stress, deformation, failure analysis of deformable bodies and structures under static and dynamic loadings, fundamental concepts and definitions in stress, strain, energy methods, plasticity, fracture, fatigue, creep, contact, impact and stability of solid bodies and plate bending problems.

ME 725. Advanced Mechanics and Failure of Composites. 3 Credits.

Concepts in static, dynamics, impact, and thermal analysis of anisotropic elastic materials are covered. Different failure theories, laminated theories, and micromechanics formulations of composites are reviewed in detail.

ME 726. Fracture Mechanics. 3 Credits.

Linear elastic fracture mechanics, energy release rate, stress intensity factor, J-integral, elasto-plastic fracture, crack tip plasticity, crack propagation, fracture fatigue crack growth, fracture tests, fracture in polymers, ceramics and composite materials.

ME 728. Stress Waves in Solids. 3 Credits.

Introduction to fundamental concepts and principles of stress waves propagating in solid materials and relevant applications and experimental techniques.

ME 729. Advanced Vibrations. 3 Credits.

Newton-Euler method; Lagrange's method; frequency response; modal analysis; eigenvalue problems; second-order stiffness systems (rod, shaft and string); Euler-Bernoulli beam theory; Rayleigh beam theory; Timoshenko beam theory; extended operator; membranes.

ME 731. Mechanical Behavior of Materials. 3 Credits.

Fundamental concepts of elastic, viscoelastic, and plastic deformation of materials; emphasizing atomic and microstructure-mechanical property relationships. Theory of static and dynamic dislocations; fracture, fatigue, and creep as well as strengthening mechanisms in materials.

ME 733. Polymer Nanocomposites. 3 Credits.

Fundamental concepts and principles of nanotechnology, nanostructured materials and nanocomposites; polymer nanocomposites processing, property characterization, and relevant modeling.

ME 734. Smart Materials and Structures. 3 Credits.

Physics, chemistry, engineering principles and applications of smart materials and structures. Recommended: Any basic materials science class, solid state physics class, or CPM 672 or CPM 674.

ME 736. Advanced Surface Analysis. 3 Credits.

Topics covered in this course include tribology, introduction to deposition technologies, surface protection mechanisms, surface preparation for deposition, hard coatings, materials science of deposition, analytical techniques for surface characterization, evaluation of mechanical performance of deposited layer, case studies.

ME 743. Biomechanics Of Impact. 3 Credits.

Fundamental sciences of engineering and human anatomy that form the basis of biomechanics of soft tissue and bone under dynamic conditions.

ME 751. Advanced Thermodynamics. 3 Credits.

Rigorous treatment of thermodynamic principles. Emphasis on the concept of availability methods as applied to various engineering systems.

ME 753. Gas Dynamics. 3 Credits.

Fundamental concepts of fluid dynamics and thermodynamics are used in the treatment of compressible flow, frictional flows, and flows with heat transfer or energy release.

ME 754. Boundary Layer Theory. 3 Credits.

Fundamental laws of motion of a viscous fluid are derived and used in the consideration of laminar boundary layers, transition phenomena, and turbulent boundary layer flows.

ME 755. Fluid Mechanics for Bio/Nanotechnologies. 3 Credits.

Fundamental principles of fluid dynamics in micro and nano scales, with applications to nanotechnology and biotechnology.

ME 761. Heat Transmission I. 3 Credits.

Advanced study of heat conduction in solids. Analytical, graphical, and numerical evaluations of the temperature field. Use of advanced mathematical methods in the solution of boundary value problems. Recommended: ME 654.

ME 790. Graduate Seminar. 1-3 Credits.

ME 791. Temporary/Trial Topics. 1-5 Credits.

ME 793. Individual Study/Tutorial. 1-5 Credits.

ME 795. Field Experience. 1-15 Credits.

ME 796. Special Topics. 1-5 Credits.

ME 797. Master's Paper. 1-3 Credits.

ME 798. Master's Thesis. 1-10 Credits.

ME 899. Doctoral Dissertation. 1-15 Credits.

Medical Laboratory Science (MLS)

MLS 194. Individual Study. 1-5 Credits.

MLS 196. Field Experience. 1-15 Credits.

MLS 199. Special Topics. 1-5 Credits.

MLS 200. Introduction to Medical Laboratory Science. 1 Credit.

Introduction to medical laboratory science. Lectures, discussions, and field trips focus on professional traits and communication, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

MLS 291. Seminar. 1-3 Credits.

MLS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 294. Individual Study. 1-3 Credits.

MLS 299. Special Topics. 1-5 Credits.

MLS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MLS 391. Seminar. 1-3 Credits.

MLS 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 394. Individual Study. 1-3 Credits.

MLS 399. Special Topics. 1-5 Credits.

MLS 435. Hematology. 2 Credits.

An introduction to the origin, maturation, and function of the formed elements of human blood. Identification of normal cells will be emphasized.

Prereq: MICR 202L or MICR 350L.

MLS 491. Seminar. 1-5 Credits.

MLS 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MLS 494. Individual Study. 1-5 Credits.

MLS 496. Field Exp/Internship. 1-15 Credits.

Restricted to Medical Laboratory Science professional majors.

MLS 499. Special Topics. 1-5 Credits.

Microbiology (MICR)

MICR 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

MICR 194. Individual Study. 1-5 Credits.

MICR 196. Field Experience. 1-15 Credits.

MICR 199. Special Topics. 1-5 Credits.

MICR 202. Introductory Microbiology. 2 Credits.

Study of the characteristics and importance of microorganisms with emphasis on their identification, control, and relationships to health and disease. Not for microbiology majors.

MICR 202L. Introductory Microbiology Lab. 1 Credit.

Study of the characteristics and importance of microorganisms with emphasis on their identification, control, and relationships to health and disease. Not for microbiology majors.

MICR 291. Seminar. 1-3 Credits.

MICR 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 294. Individual Study. 1-5 Credits.

MICR 299. Special Topics. 1-5 Credits.

MICR 350. General Microbiology. 3 Credits.

Principles of microbiology for students requiring a rigorous professionally oriented course. This course is a prerequisite to most microbiology courses. Topics, as applied to an overview of microorganisms, include structure, physiology, metabolism, growth, genetics, ecology, pathogenesis, immunology, immunization, and infectious disease treatment/prevention. Prereq: BIOL 151 and CHEM 122.

MICR 350L. General Microbiology Lab. 2 Credits.

Principles of microbiology for students requiring a rigorous professionally-oriented course. Prereq: BIOL 150 and CHEM 122.

MICR 352L. General Microbiology Lab II. 2 Credits.

Application of principles of microbiology introduced in General Microbiology II using advanced microbiology techniques and tools. Prereq: MICR 350L. Coreq: MICR 352.

MICR 352. General Microbiology II. 3 Credits.

Further exploration and application of microbiological concepts introduced in MICR 350 in a manner that develops skills important for successful completion of a microbiology degree and success in careers related to microbiology. Prereq: MICR 350.

MICR 354. Scientific Writing. 3 Credits.

This course will emphasize the qualities of sound logic, good structure, and honesty in writing journal articles and science pieces for popular press. Prereq: ENGL 120, MICR 350, junior standing. Satisfies upper-division writing requirement.

MICR 373. Equine Health Management. 1 Credit.

This course introduces the student to learning through a case-based approach to equine disease. Case material highlights equine health problems seen in the Midwest. Case questions encourage students to think about disease prevention, management and eradication. Prereq: ANSC 114 and VETS 135.

MICR 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MICR 391. Seminar. 1-3 Credits.

MICR 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 394. Individual Study. 1-5 Credits.**MICR 397. Fe/Coop Ed/Internship. 1-4 Credits.****MICR 399. Special Topics. 1-5 Credits.****MICR 445. Animal Cell Culture Techniques. 2 Credits.**

Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for graduate credit - see MICR 645.}.

MICR 450L. Infectious Disease Pathogenesis Laboratory. 2 Credits.

This course will explore laboratory-based activities specifically designed for the microbiology major. {Also offered at the graduate level as MICR 650L.}.

MICR 450. Infectious Disease Pathogenesis. 3 Credits.

Students will study mechanisms of bacterial, viral, fungal, and parasitic pathogenesis and the immune response to pathogens. Prereq: MICR 350 or 460/660 or 470/670. {Also offered for graduate credit - see MICR 650.}.

MICR 452. Microbial Ecology. 3 Credits.

Study of the relationships between microbes and the physical, chemical, and biotic components of their environments. The role of microbes in nutrient cycling, bioremediation, biocontrol, biological waste treatment, fuel production, and energy recovery. Prereq: MICR 350, MICR 350L. {Also offered for graduate credit - see MICR 652.}.

MICR 453. Food Microbiology. 3 Credits.

Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microflora of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. Prereq: MICR 350L. {Also offered for graduate credit - see MICR 653.}.

MICR 460. Pathogenic Microbiology. 3 Credits.

Study of the microorganisms that cause disease and of disease processes. Prereq: MICR 202 or 350. {Also offered for graduate credit - see MICR 660.}.

MICR 460L. Pathogenic Microbiology Laboratory. 2 Credits.

Isolation and identification of pathogenic microorganisms. Prereq: MICR 350L. {Also offered for graduate credit - see MICR 661.}.

MICR 463. Clinical Parasitology. 2 Credits.

A study of protozoan and helminthic parasites of humans, with an emphasis on clinical identification, life histories, and control. Prereq: BIOL 150, BIOL 150L. {Also offered for graduate credit - see MICR 663.}.

MICR 470. Basic Immunology. 3 Credits.

An overview of the role of the immune system including the functions of humoral and cell-mediated immunity in health and disease. Prereq: MICR 350. {Also offered for graduate credit - see MICR 670.}.

MICR 471. Immunology and Serology Laboratory. 2 Credits.

Basic immunological and serological procedures. Prereq or Co-req: MICR 350 and MICR 350L. {Also offered for graduate credit - see MICR 671.}.

MICR 472. Clinical Immunology. 3 Credits.

Concepts in immunology including special attention to clinical conditions that may appear as a result of immune system activity. Prereq: MICR 470. {Also offered for graduate credit - see MICR 672.}.

MICR 475. Virology. 3 Credits.

The biology of viruses with emphasis on virus replication and pathogenesis. Co-req: MICR 470. {Also offered for graduate credit - see MICR 675.}.

MICR 480. Microbial Physiology. 3 Credits.

This class will explore the composition and function of eubacterial and archaeobacterial cell structure. Further functional exploration will go into nutrient transport in bacteria, principles of energy-yielding carbohydrate metabolism, bacterial fermentation, respiration, and gene regulations of metabolic pathways. Topics such as biofilms, quorum sensing, and the microbiome will be used to apply physiological concepts. Prereq: MICR 350, MICR 350L. Co-req: BIOC 460. {Also offered for graduate credit - see MICR 680.}.

MICR 481. Microbial Genomics with Computational Laboratory. 3 Credits.

Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. Recommended: STAT 330. Prereq: BIOL/PLSC 315. {Also offered for graduate credit - see MICR 681.}.

MICR 482. Microbial Genetics. 3 Credits.

Microbial genetics will explore gene identification, mutation, DNA repair, gene transfer, recombination, bacteriophage genetics, and gene regulation. Topics such as bacterial antibiotic resistance, genetic testing and manipulation for biotechnological applications will be used to apply genetic concepts. Prereq: MICR 350. Coreq: BIOC 460. {Also offered for graduate credit - see MICR 682.}.

MICR 485. Capstone Experience in Microbiology - Experimental Design. 1 Credit.

The capstone experience is the culmination of earlier course work that will allow students to integrate their knowledge of microbiology. The experimental design course will focus on using the scientific method to design and propose a group research project. Prereq: MICR 352, MICR 352L and Microbiology majors only.

MICR 486. Capstone Experience in Microbiology - Research Project. 2 Credits.

The capstone experience is the culmination of earlier course work that will allow students to integrate their knowledge of microbiology. The research project course will focus on implementation of the experiments proposed in the experimental design course. Prereq: MICR 485 and Microbiology majors only.

MICR 491. Seminar. 1-5 Credits.**MICR 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MICR 493. Undergraduate Research. 1-5 Credits.**MICR 494. Individual Study. 1-5 Credits.****MICR 496. Field Experience. 1-15 Credits.****MICR 497. FE/Coop Ed/Internship. 1-15 Credits.****MICR 499. Special Topics. 1-5 Credits.****MICR 645. Animal Cell Culture Techniques. 2 Credits.**

Methods of animal cell culture propagation and uses for cell culture systems. {Also offered for undergraduate credit - see MICR 445.}

MICR 650L. Infectious Disease Pathogenesis Laboratory. 2 Credits.

This course will explore laboratory-based activities specifically designed for the microbiology major. {Also offered at the undergraduate level as MICR 450L.}

MICR 650. Infectious Disease Pathogenesis. 3 Credits.

Students will study mechanisms of bacterial, viral, fungal, and parasitic pathogenesis and the immune response to pathogens. Prereq: MICR 660 or MICR 670. {Also offered for undergraduate credit - see MICR 450.}

MICR 652. Microbial Ecology. 3 Credits.

Study of the relationships between microbes and the physical, chemical, and biotic components of their environments. The role of microbes in nutrient cycling, bioremediation, biocontrol, biological waste treatment, fuel production, and energy recovery. {Also offered for undergraduate credit - see MICR 452.}

MICR 653. Food Microbiology. 3 Credits.

Study of the nature, physiology, and interactions of microorganisms in foods. Introduction to foodborne diseases, effects of food processing on the microflora of foods, principles of food preservation, food spoilage, and foods produced by microorganisms. {Also offered for undergraduate credit - see MICR 453.}

MICR 660. Pathogenic Microbiology. 3 Credits.

Study of the microorganisms that cause disease and of disease processes. {Also offered for undergraduate credit - see MICR 460.}

MICR 661. Pathogenic Microbiology Lab. 2 Credits.

Isolation and identification of pathogenic microorganisms. {Also offered for undergraduate credit - see MICR 460L.}

MICR 663. Clinical Parasitology. 2 Credits.

A study of protozoan and helminthic parasites of humans, with an emphasis on clinical identification, life histories, and control. {Also offered for undergraduate credit - see MICR 463.}

MICR 670. Basic Immunology. 3 Credits.

An overview of the role of the immune system including the functions of humoral and cell-mediated immunity in health and disease. {Also offered for undergraduate credit - see MICR 470.}

MICR 671. Immunology and Serology Laboratory. 2 Credits.

Basic immunological and serological procedures. {Also offered for undergraduate credit - see MICR 471.}

MICR 672. Clinical Immunology. 3 Credits.

Concepts in immunology including special attention to clinical conditions that may appear as a result of immune system activity. {Also offered for undergraduate credit - see MICR 472.}

MICR 675. Virology. 3 Credits.

The biology of viruses with emphasis on virus replication and pathogenesis. {Also offered for undergraduate credit - see MICR 475.}

MICR 680. Microbial Physiology. 3 Credits.

This class will explore the composition and function of eubacterial and archaeobacterial cell structure. Further functional exploration will go into nutrient transport in bacteria, principles of energy-yielding carbohydrate metabolism, bacterial fermentation, respiration, and gene regulations of metabolic pathways. Topics such as biofilms, quorum sensing, and the microbiome will be used to apply physiological concepts. {Also offered for undergraduate credit - see MICR 480.}

MICR 681. Microbial Genomics with Computational Laboratory. 3 Credits.

Microbial genome science with additional emphasis on microbial evolution and environmental science. Topics include: i) genomic diversity, ii) the consequences of horizontal gene transfer, iii) single cell and population genomics, and iv) environmental metagenomics. {Also offered for undergraduate credit - see MICR 481.}.

MICR 682. Microbial Genetics. 3 Credits.

Microbial genetics will explore gene identification, mutation, DNA repair, gene transfer, recombination, bacteriophage genetics, and gene regulation. Topics such as bacterial antibiotic resistance, genetic testing and manipulation for biotechnological applications will be used to apply genetic concepts. {Also offered for undergraduate credit - see MICR 482.}.

MICR 690. Graduate Seminar. 1-3 Credits.**MICR 695. Field Experience. 1-15 Credits.****MICR 696. Special Topics. 1-5 Credits.****MICR 722. International Health Systems, Policy and Biosecurity. 2 Credits.**

This course will provide students with the necessary information to understand international health regulations and the potential implications on animal health, human health, global trade and food safety.

MICR 723. International Animal Production, Disease Surveillance and Public Health. 3 Credits.

The course will enable students to appreciate tropical animal production, food safety & public health from a developing country's perspective, prepare them for global career opportunities, foster an international perspective and understanding of diverse systems.

MICR 724. Applied Epidemiology and Biostatistics. 3 Credits.

This course will enable the students to get an understanding of how to apply epidemiological tools in study designs data management and analysis. Students will create or use existing databases and learn data management and analysis using software such as EPIINFO.

MICR 752. Advanced Topics in Food Safety Microbiology. 3 Credits.

Overview of food systems and in-depth evaluation of microbiological food safety concerns with an emphasis on public health aspects of detecting, tracking, and controlling pathogens in the food supply.

MICR 756. Advanced Topics in Public Health Microbiology. 3 Credits.

Through the use of case-based learning, students explore several key areas of public health microbiology. Case questions encourage students to think about disease prevention, management and eradication. Students will be expected to read and research information on each case and answer discussion questions.

MICR 762. Advanced Pathogenic Bacteriology. 3 Credits.

Biophysical and biochemical mechanisms by which microorganisms cause infectious disease and host reactions to the disease.

MICR 767. Critical Thinking for the Life Sciences. 3 Credits.

This course is designed to impart critical thinking skills to graduate students in the life sciences. Topics such as information retrieval, problem-solving, Socratic questioning and logical fallacies in sciences will be covered by in-class work shops and application-based assignments.

MICR 770. Immunology of Chronic Infections. 3 Credits.

A study of the host's response to chronic infections, which is illustrated using a framework of diseases of worldwide importance that present different pathologies and outcomes. Prereq: MICR 670.

MICR 775. Molecular Virology. 3 Credits.

An in-depth study of current areas of research on human and animal viruses. The replication, pathogenesis, diagnosis, prevention, and control of viruses using contemporary molecular and cellular biology approaches will be examined. Prereq: MICR 660, MICR 670, MICR 675.

MICR 781. Advanced Bacterial Physiology. 3 Credits.

In-depth consideration of various topics in bacterial physiology such as autotrophy, bacterial growth and growth yields, energy-yielding metabolism, and regulation of catabolic pathways. Prereq: MICR 680.

MICR 782. Molecular Microbiological Techniques. 3 Credits.

Familiarize students with current molecular and immunologic strategies and techniques commonly used to study infectious disease processes.

MICR 783. Advanced Bacterial Genetics and Phage. 3 Credits.

Mechanisms of genetic rearrangement and regulation in bacteria and phage. Recombinant DNA. Prereq: MICR 682.

MICR 785. Pathobiology. 3 Credits.

A comprehensive understanding of the molecular mechanisms that underlie disease pathogenesis and lesion development. Investigation and presentation on mechanisms underlying a specific disease entity of either human or animal origin. Prereq: MICR 660.

MICR 790. Graduate Seminar. 1-3 Credits.

MICR 791. Temporary/Trial Topics. 1-5 Credits.

MICR 792. Graduate Teaching Experience. 1-6 Credits.

MICR 793. Individual Study/Tutorial. 1-5 Credits.

MICR 794. Practicum/Internship. 1-8 Credits.

MICR 795. Field Experience. 1-15 Credits.

MICR 796. Special Topics. 1-5 Credits.

MICR 797. Master's Paper. 1-3 Credits.

MICR 798. Master's Thesis. 1-10 Credits.

MICR 801. Foundation in Microbiology Research I. 4 Credits.

A study of the scientific process and the principles and applications of microbiology in the areas of cell structure and function, pathways and transformations, and information flow.

MICR 802. Foundation in Microbiology Research II. 4 Credits.

A study of the principles and applications of microbiology in the areas of genomics, evolution, ecology, and infectious disease.

MICR 892. Graduate Teaching Experience. 1-6 Credits.

MICR 893. Individual Study/Tutorial. 1-5 Credits.

MICR 899. Doctoral Dissertation. 1-15 Credits.

Military Science (MS)

MS 101. Foundations of Officership. 1 Credit.

Introduce fundamental concepts consistent with the military culture; includes leadership, ethics, and Army values. Increase self-confidence through team study and activities involving military skills, leadership reaction course, and making presentations. Weekly lab required. Recommended Coreq: MS 310.

MS 102. Basic Leadership. 1 Credit.

Principles of effective leading; reinforce self-confidence; develop communication skills to improve performance and group interaction; relate organizational ethical values to leadership effectiveness. Weekly lab required. Recommended Coreq: MS 320. S.

MS 110. Army ROTC Physical Fitness. 2 Credits.

Instruction in planning and leading physical fitness programs. Development of physical fitness required of an Army officer. Emphasis on development of an individual fitness program and the role of exercise and fitness in ones life. May be repeated for credit.

MS 194. Individual Study. 1-5 Credits.

MS 196. Field Experience. 1-15 Credits.

MS 199. Special Topics. 1-5 Credits.

MS 201. Individual Leadership Studies. 2 Credits.

Apply ethics-based leadership skills in oral presentations, writing concisely, planning events, coordinating group efforts, first aid skills, land navigation, and basic military tactics. Focuses on personal development and includes ROTC leadership assessment program. Recommended Coreq: MS 310. F.

MS 202. Leadership and Teamwork. 2 Credits.

Continuation of individual and team building concepts for small unit operations: provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Recommended Coreq: MS 310. S.

MS 210. Leadership Laboratory. 1 Credit.

MS 291. Seminar. 1-3 Credits.

MS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 294. Individual Study. 1-5 Credits.

MS 299. Special Topics. 1-5 Credits.

MS 301. Leadership and Problem Solving. 3 Credits.

Continuation of individual and team building concepts for small unit operations; provides a conceptual framework for decision making, planning, and time management; making safety assessments; introduces movement techniques and pre-execution checks. Prereq: Departmental approval. Coreq: MS 310. S.

MS 302. Leadership and Ethics. 3 Credits.

Develop skills in planning and leading by conducting training for lower division students. Introduction to operational art and tactics; includes a series of practical opportunities to lead small groups, receive personal assessments and evaluations. Prereq: Departmental approval. Coreq: MS 310. F.

MS 310. Leadership Laboratory. 1 Credit.

Individual and collective drill, small unit leadership experience, and tactical training to lead small groups, receive personal assessments and encouragement, and defensive tactics. Develop skills in planning and leading by conducting training for lower-division students. Weekly lab, physical fitness program, and field exercises required. May be repeated. F.

MS 320. Leadership Laboratory. 1 Credit.

Small unit drill, as well as tactical application of leadership fundamentals at the squad/patrol leader level. May be repeated. S.

MS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MS 391. Seminar. 1-3 Credits.**MS 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 394. Individual Study. 1-5 Credits.**MS 399. Special Topics. 1-5 Credits.****MS 401. Leadership and Management. 3 Credits.**

Plan, conduct, and evaluate activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 410.

MS 402. Officership. 3 Credits.

Continuation of planning, conducting, and evaluating activities of the ROTC cadet organization. Articulate goals, put plans into action. Introduce staff organization and processes. Assess organizational cohesion and develop improvement strategies. Apply Army policies. Prereq: Departmental approval. Coreq: MS 420.

MS 410. Leadership Laboratory. 1 Credit.

Assumption of command and staff positions within the cadet battalion. May be repeated. F.

MS 420. Leadership Laboratory. 1 Credit.

Assumption of command and staff positions within the cadet battalion. May be repeated. S.

MS 491. Seminar. 1-5 Credits.**MS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MS 494. Individual Study. 1-5 Credits.**MS 496. Field Experience. 1-15 Credits.****MS 499. Special Topics. 1-5 Credits.**

Modern Languages (LANG)

LANG 101. Basic ESL: Integrated Skills. 1-20 Credits.

Intensive integrated skills approach to basic English for novice non-native speakers; emphasis on reading, writing, listening and speaking skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 102. English Structure for Non-Native Speakers. 5 Credits.

Intensive study and practice of English grammar, focusing on syntax and discourse usage. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 103. English for Non-Native Speakers: Intermediate Grammar & Writing I. 1-5 Credits.

Grammar, usage, syntax, and extensive work with sentence and paragraph structure, stressing unity, and coherence. Emphasis on skills required for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 104. English for Non-Native Speakers: Vocabulary/Reading. 1-5 Credits.

Intensive instruction in vocabulary and reading skills required for successful completion of university work by speakers of English as a second language (ESL). May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 105. English for Non-Native Speakers: Intermediate Grammar/Writing II. 1-5 Credits.

Extended practice in grammar, usage, syntax, and work with paragraph and essay structure. Emphasis on skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 106. English for Non-Native Speakers: Oral Skills. 1-5 Credits.

Intensive instruction in speaking and listening skills required for successful completion of university work by speakers of English as a second language (ESL). May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 107. Language Use in Writing for ESL I. 1-5 Credits.

Advanced English grammar forms and essay composition for ESL. Focuses on the production and control of grammatical sentences in written communication, with emphasis on skills needed for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 108. Studies in American Language and Culture. 3 Credits.

This content-based course is designed to deepen understanding of American culture and language through exposure to and study of history, values, and behaviors of American society and subcultures within it. The course provides integrated language skills practice as students use text, film, and classroom discussion to both learn and communicate about American culture.

LANG 109. Language Use in Writing for ESL II. 1-5 Credits.

A continuation of LANG 107. Focuses on production and control of grammatical structures in written communication. Emphasis on skills required for academic work. May be repeated. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 110. Integrated Academic Language Skills for Graduate Students. 5-10 Credits.

Advanced-level integrated language skills and strategies necessary for academic success. Assignments will focus on tasks expected in graduate-level coursework. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 111. Advanced Issues in American and University Culture. 3-5 Credits.

Studies of the culture of America and the university. Designed for advanced language students intending to participate in graduate study. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 112. Advanced Issues in English Language for Non-Native Speakers. 3-5 Credits.

Studies of the language issues that are problematic for advanced level non-native speakers, with a primary focus on skills needed to fully participate in graduate-level programs. May be repeated for credit. This course will not satisfy general education or major requirements but will count toward the total number of credits for graduation. This course will also count for credit toward financial aid.

LANG 194. Individual Study. 1-5 Credits.**LANG 196. Field Experience. 1-15 Credits.****LANG 199. Special Topics. 1-5 Credits.****LANG 291. Seminar. 1-5 Credits.****LANG 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 294. Individual Study. 1-5 Credits.**LANG 299. Special Topics. 1-5 Credits.****LANG 379. Global Seminar. 1-6 Credits.**

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

LANG 391. Seminar. 1-3 Credits.**LANG 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 394. Individual Study. 1-5 Credits.

LANG 399. Special Topics. 1-5 Credits.

LANG 406. Oral English Language Strategies and Skills for Presentation. 2 Credits.

This course is designed to help non-native speakers of English speak more effectively and confidently in professional contexts such as research presentations at conferences, competitions, poster sessions, job/internship interviews, or a dissertation defense. {Also offered for graduate credit - see LANG 606.}.

LANG 491H. Seminar. 1-3 Credits.

LANG 491. Seminar. 1-5 Credits.

LANG 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

LANG 494. Individual Study. 1-5 Credits.

LANG 496. Field Experience. 1-15 Credits.

LANG 499. Special Topics. 1-5 Credits.

LANG 606. Oral English Language Strategies and Skills for Presentation. 2 Credits.

This course is designed to help non-native speakers of English speak more effectively and confidently in professional contexts such as research presentations at conferences, competitions, poster sessions, job/internship interviews, or a dissertation defense. {Also offered for undergraduate credit - see LANG 406.}.

LANG 690. Graduate Seminar. 1-5 Credits.

LANG 696. Special Topics. 1-5 Credits.

LANG 701. English Language and Classroom Skills for International GTAs. 3 Credits.

This course is designed to help international graduate students become effective teachers by developing the language and teaching skills necessary to meet the expectations of undergraduate students at NDSU. Students gain practical experience in classroom leadership, lesson planning, and presenting lectures. It is taught in tandem with a co-requisite language tutorial that is tailored to individual language needs. Co-req: LANG 702.

LANG 702. English Language Tutorial for International GTAs. 1 Credit.

In conjunction with LANG 701, this course is designed to help international graduate students become effective teachers by developing the language necessary to meet the expectations of undergraduate students at NDSU. Assignments and one-on-one tutorials are designed to identify individual language deficiencies and to improve on assessed needs. Can be repeated for credit. Co-req: LANG 701.

LANG 704. Language Strategies For Literature Reviews. 3 Credits.

Linguistic strategies develop critical reading and oral skills for literature reviews and academic discourse, both for discipline-specific and cross-disciplinary contexts. Computational and corpus-based tools are used to advance each graduate student's practical understanding of the vocabulary, themes, and rhetorical moves in their field of study and on a particular topic. Through comprehensive readings in a student-selected domain of scholarship, the student will gain expertise in a topic of research and practice in speaking professionally about the themes, trends, results and ideas that emerge from those readings. NB: This course is multidisciplinary and designed for graduate writers across a variety of language competencies. It is appropriate for both native and non-native speakers of English.

LANG 709. Language Strategies for Research Writing. 3 Credits.

Linguistic analysis, grammar instruction, and intensive writing practice will develop language skills for academic and professional writing.

LANG 790. Graduate Seminar. 1-5 Credits.

LANG 793. Individual Study/Tutorial. 1-5 Credits.

LANG 796. Special Topics. 1-5 Credits.

Music (MUSC)

MUSC 100. Music Appreciation. 3 Credits.

Understanding and appreciating musical styles and composers with some emphasis on the relationship of music to concurrent social and artistic trends. Designed for non-music majors.

MUSC 101. Fundamentals of Music. 3 Credits.

Introduction to fundamental elements of music through the study of scales, chords, basic harmonic progressions, rhythms, and terminology.

MUSC 103. Introduction to Music History. 3 Credits.

Introduction to the major works of music in the Western tradition which define the stylistic elements of musical periods in history.

MUSC 108. Roots of American Popular Music. 3 Credits.

Survey of American popular music and musicians from Civil War times through the present with an emphasis on historical and sociological influences. Designed for non-music majors.

MUSC 111. Marching Band. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 112. University Band. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 114. University Summer Band. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 115. University Chorus. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 116. Cantemus. 1 Credit.

A non-auditioned women's choir which will perform music of all style periods. May be repeated for credit.

MUSC 117. Statesmen of NDSU. 1 Credit.

A non-auditioned men's choir which will perform music of all style periods.

MUSC 130. Theory and Analysis I. 3 Credits.

Introduction to the compositional practices of the 18th and 19th centuries. Coreq: MUSC 132.

MUSC 131. Theory and Analysis II. 3 Credits.

Introduction to the compositional practices of the 18th and 19th centuries. Prereq: MUSC 130. Coreq: MUSC 133.

MUSC 132. Ear Training & Sight Singing I. 1 Credit.

Development of sight singing and ear training skills. Laboratory band and chorus required. Coreq: MUSC 130.

MUSC 133. Ear Training & Sight Singing II. 1 Credit.

Development of sight singing and ear training skills. Laboratory band and chorus required. Coreq: MUSC 131.

MUSC 160. Piano Class I. 1 Credit.

Group instruction in the basic fundamentals of playing the piano. Designed primarily to meet the basic piano proficiency requirements for music education majors.

MUSC 161. Piano Class II. 1 Credit.

Group instruction in the basic fundamentals of playing the piano. Designed primarily to meet the basic piano proficiency requirements for music education majors.

MUSC 162. Voice Class. 1 Credit.

Group instruction in the fundamentals of singing. For music students who do not major in voice. May be repeated.

MUSC 163. Voice Class for Instrumentalists. 2 Credits.

Group instruction in the fundamentals of singing. For instrumental music education students who do not major in voice. May be repeated. Instrumental music majors only.

MUSC 165. Applied Piano. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 166. Applied Composition. 1 Credit.

Introductory individual lessons in composition focusing on mastering simple compositional techniques in both melody and harmony. May be repeated for credit. Prereq: MUSC 132.

MUSC 167. Applied Voice. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 168. Applied Wind Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 169. Applied Percussion Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated.

MUSC 170. Applied Upper Strings. 1 Credit.

Individual lessons for upper strings. May be repeated.

MUSC 171. Applied Lower Strings. 1 Credit.

Individual lessons for lower strings. May be repeated.

MUSC 172. Applied Guitar. 1 Credit.

Individual lessons for guitar. May be repeated.

MUSC 173. Supplementary Applied Study. 1-2 Credits.

Private lessons. Prereq: Qualifying examination in performance. For music performance majors. Registration should be for one credit; add one credit for supplementary pedagogy study. May be repeated.

MUSC 174. Pronunciation for Singers I. 1 Credit.

Instruction in the proper pronunciation of English, Italian, Spanish, and Latin for song, oratorio, and opera.

MUSC 175. Pronunciation for Singers II. 1 Credit.

Instruction in the proper pronunciation of German and French for song, oratorio, and opera. Prereq: MUSC 174.

MUSC 180. Performance Attendance. 0 Credits.

Attendance at regional performances, including NDSU events. Minimum of five registrations necessary for graduation for music majors, two registrations for music minors. May be repeated. P/F only.

MUSC 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

MUSC 194. Individual Study. 1-5 Credits.**MUSC 196. Field Experience. 1-15 Credits.****MUSC 199. Special Topics. 1-5 Credits.****MUSC 215. University Chamber Singers. 1 Credit.**

This is a mixed ensemble which will study and perform a wide variety of choral repertoire and become more musically literate. It will meet needs of developing musicianship within an auditioned smaller ensemble. Admission by audition only. Repeatable for credit.

MUSC 230. Theory and Analysis III. 3 Credits.

Advanced harmonic and chromatic materials of the common practice period, and analysis and stylistic compositions of music from ancient Greece to contemporary practice. Prereq: MUSC 130 Coreq: MUSC 232.

MUSC 231. Theory and Analysis IV. 3 Credits.

Advanced harmonic and chromatic materials of the common practice period, and analysis and stylistic compositions of music from ancient Greece to contemporary practice. Prereq: MUSC 230. Coreq: MUSC 233.

MUSC 232. Ear Training & Sight Singing III. 1 Credit.

Advanced work with ear training and sight singing materials. Laboratory band and chorus required. Coreq: MUSC 230.

MUSC 233. Ear Training & Sight Singing IV. 1 Credit.

Advanced work with ear training and sight singing materials. Laboratory band and chorus required. Coreq: MUSC 232.

MUSC 250. Basic Conducting. 2 Credits.

Study and development of basic ensemble conducting skills.

MUSC 260. Piano Class III. 1 Credit.

Intermediate instruction in class piano. Prereq: MUSC 161.

MUSC 261. Piano Class IV. 1 Credit.

Intermediate instruction in class piano. Prereq: MUSC 161.

MUSC 265. Applied Piano. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 266. Applied Composition. 1 Credit.

Individual lessons in composition for a variety of musical media. May be repeated twice. Prereq: MUSC 166.

MUSC 267. Applied Voice. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 268. Applied Wind Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 269. Applied Percussion Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 270. Applied Upper Strings. 1 Credit.

Individual lessons for upper strings. May be repeated.

MUSC 271. Applied Lower Strings. 1 Credit.

Individual lessons for lower strings. May be repeated.

MUSC 272. Applied Guitar. 1 Credit.

Individual lessons for guitar. May be repeated.

MUSC 273. Supplementary Applied Study. 1-2 Credits.

For music performance majors. Registration should be for one credit; add one credit for supplementary pedagogy study. May be repeated.

MUSC 291. Seminar. 1-3 Credits.**MUSC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 294. Individual Study. 1-5 Credits.**MUSC 299. Special Topics. 1-5 Credits.****MUSC 301. Musical Theatre Troupe. 1 Credit.**

A select performance ensemble of musical theatre performers. This ensemble meets twice a week to develop scenes, songs, and choreography from classic and contemporary musical theatre repertoire. May be repeated. Prereq: selection by audition only.

MUSC 302. Wind Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 303. Wind Symphony. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 304. University Symphony Orchestra. 1 Credit.

Major symphonic ensemble jointly sponsored by NDSU and MSUM. Prereq: Membership by audition only. May be repeated.

MUSC 306. Concert Choir. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 311. Jazz Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 312. Percussion Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 313. Trombone Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 314. Brass Chamber Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 315. Woodwind Chamber Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 316. String Chamber Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 317. Madrigal Singers. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 318. Mixed Chamber Ensemble. 1 Credit.

Mixed chamber ensemble. Membership in all organizations is subject to approval of the director. May be repeated for credit.

MUSC 319. Opera Workshop. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 320. Vocal Chamber Ensemble. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 321. Piano Chamber Music. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 322. Jazz Combo. 1 Credit.

Membership in all organizations is subject to approval of the director. May be repeated.

MUSC 331. Instrumental Arranging. 2 Credits.

Arranging materials for bands. Prereq: MUSC 231.

MUSC 332. Survey of Choral Literature. 2 Credits.

A study of choral literature from Renaissance through the 21st century. Prereq: MUSC 340.

MUSC 340. Music History I. 3 Credits.

Study of the history of music from the Greek period through the Baroque. Prereq: MUSC 103.

MUSC 341. Music History II. 3 Credits.

Study of the history of music from the Classical period through the 20th century. Prereq: MUSC 340.

MUSC 344. Wind Band Literature. 2 Credits.

A survey of suitable literature for the wind band, covering the repertoire considered basic to the wind band as well as literature of quality for a variety of levels of difficulty.

MUSC 346. Survey/Vocal Literature. 2 Credits.

An overview of vocal literature from 1600 to present. Representative works will include literature from the Western tradition.

MUSC 349. Vocal Methods & Pedagogy I. 2 Credits.

Instruction in vocal pedagogy and methods for music majors.

MUSC 350. Vocal Methods & Pedagogy II. 2 Credits.

Advanced instruction in vocal pedagogy and methods for music education majors. Prereq: MUSC 349.

MUSC 351. Instrumental Conducting & Literature. 2 Credits.

Fundamentals and techniques of conducting instrumental ensembles with practical application through the study of instrumental literature.

MUSC 352. Choral Conducting & Literature. 2 Credits.

Fundamentals and techniques of conducting choral ensembles with practical application through the study of choral literature. Prereq: MUSC 103 and MUSC 250.

MUSC 353. Woodwind Methods I. 2 Credits.

Class instruction in woodwind instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 354. Woodwind Methods II. 2 Credits.

Class instruction in woodwind instruments for instrumental music education majors. Emphasis on advanced pedagogical principles, applied competency of fundamentals and in-depth coverage of literature.

MUSC 355. Brass Methods. 2 Credits.

Class instruction in brass instruments for vocal and instrumental music education majors. Emphasis on pedagogical principles, applied competency of fundamentals, and literature.

MUSC 357. Marching Band Methods and Techniques. 1 Credit.

This course is intended to assist in developing the skills and knowledge essential for the successful administration and implementation of a sports band (marching and pep bands) program within the public school context. Prereq: Students must be music majors.

MUSC 358. Jazz Methods. 1 Credit.

This course is intended to assist in developing the skills and knowledge essential for the successful administration and implementation of a jazz program (Big Band and Combos) within the public school context. Prereq: music majors only.

MUSC 359. Percussion Methods. 2 Credits.

Class instruction in percussion instruments for music education majors. Emphasis on pedagogical principles, applied competency, and literature.

MUSC 364. Jazz Improvisation. 2 Credits.

Basic concepts necessary to play and teach the fundamentals of jazz improvisation. May be repeated.

MUSC 365. Applied Piano. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 366. Applied Composition. 1 Credit.

Individual lessons in composition for a variety of musical media. May be repeated twice. Prereq: MUSC 231.

MUSC 367. Applied Voice. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 368. Applied Wind Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 369. Applied Percussion Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 370. Applied Upper Strings. 1 Credit.

Individual lessons for upper strings. May be repeated.

MUSC 371. Applied Lower Strings. 1 Credit.

Individual lessons for lower strings. May be repeated.

MUSC 372. Applied Guitar. 1 Credit.

Individual lessons for guitar. May be repeated.

MUSC 373. Supplementary Applied Study. 2-3 Credits.

For music performance majors. Typical registration should be for two credits; add one credit for supplementary pedagogy study. May be repeated.

MUSC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

MUSC 380. Recital. 1 Credit.

Preparation and presentation of a half recital in instrumental, keyboard, or vocal performance. May be repeated.

MUSC 384. Composition I. 1 Credit.

This course will serve as an introduction to compositional techniques. Group and private instruction will be given during the semester. Prereq: MUSC 231.

MUSC 385. Music Entrepreneurship. 3 Credits.

Students will learn and display entrepreneurial skills through class work, guest lectures, and project-based activities and assignments in technology, business, writing, promotion, networking, and other music professional studies.

MUSC 391. Seminar. 1-3 Credits.**MUSC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 394. Individual Study. 1-5 Credits.**MUSC 399. Special Topics. 1-5 Credits.****MUSC 411. Form and Analysis. 3 Credits.**

Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 611.}.

MUSC 423. Piano Pedagogy I. 2 Credits.

Methods and materials for teaching beginning and early-grade piano students. Prereq: Music majors or minors. {Also offered for graduate credit - see MUSC 623}.

MUSC 424. Piano Pedagogy II. 2 Credits.

Methods and materials for teaching intermediate and advance-level piano students. Prereq: Music majors or minors. {Also offered for graduate credit - see MUSC 624.}.

MUSC 430. Counterpoint. 3 Credits.

Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 630.}.

MUSC 431. Contemporary Harmonic Techniques. 3 Credits.

Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 631.}.

MUSC 434. Analytical Techniques. 3 Credits.

Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor. Prereq: MUSC 231. {Also offered for graduate credit - see MUSC 634.}.

MUSC 441. Symphonic Literature. 2 Credits.

Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for graduate credit - see MUSC 641.}.

MUSC 442. Opera Literature. 2 Credits.

Survey of the history of opera with emphasis on selected works. Prereq: MUSC 340 and MUSC 341 or consent of instructor. {Also offered for graduate credit - see MUSC 642.}.

MUSC 443. Keyboard Literature. 3 Credits.

Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. Prereq: Permission of instructor. May be repeated. {Also offered for graduate credit - see MUSC 643.}.

MUSC 465. Applied Piano. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 466. Applied Composition. 1 Credit.

Individual lessons in composition for a variety of musical media. May be repeated. Prereq: MUSC 366.

MUSC 467. Applied Voice. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 468. Applied Wind Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 469. Applied Percussion Instruments. 1 Credit.

Private lessons. Prereq: Qualifying examination in performance. May be repeated twice.

MUSC 470. Applied Upper Strings. 1 Credit.

Individual lessons for upper strings. May be repeated.

MUSC 471. Applied Lower Strings. 1 Credit.

Individual lessons for lower strings. May be repeated.

MUSC 472. Applied Guitar. 1 Credit.

Individual lessons for guitar. May be repeated.

MUSC 473. Supplementary Applied Study. 3-4 Credits.

For music performance majors. Typical registration should be for three credits; add one credit for supplementary pedagogy study. May be repeated.

MUSC 480. Recital. 1 Credit.

Capstone for performance majors. May be repeated.

MUSC 481. Instrumental Music Methods. 2 Credits.

Specialized methods and classroom practices dealing with teaching instrumental music at the secondary level.

MUSC 482. Choral Music Methods. 2 Credits.

Specialized methods and classroom practices dealing with teaching choral music at the secondary level.

MUSC 483. Elementary Music Methods. 2 Credits.

Specialized methods and classroom practices dealing with teaching elementary music.

MUSC 484. Composition II. 1 Credit.

This course will continue study of compositional techniques and will require finished compositions for performances. Group and private instruction will be given during the semester. Prereq: MUSC 231 and MUSC 384.

MUSC 491. Seminar. 1-5 Credits.**MUSC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 494. Individual Study. 1-5 Credits.**MUSC 496. Field Experience. 1-15 Credits.****MUSC 499. Special Topics. 1-5 Credits.****MUSC 611. Form and Analysis. 3 Credits.**

Study of the types of tonal relationships which create musical works of art. Examination of small forms such as motive and phrase, and progressing to large forms such as fugue, variation, and sonata. {Also offered for undergraduate credit - see MUSC 411.}.

MUSC 623. Piano Pedagogy I. 2 Credits.

Methods and materials for teaching beginning and early-grade piano students. Prereq: Music majors or minors. {Also offered for undergraduate credit - see MUSC 423.}.

MUSC 624. Piano Pedagogy II. 2 Credits.

Methods and materials for teaching intermediate and advance-level piano students. Prereq: Music majors or minors. {Also offered for undergraduate credit - see MUSC 424.}.

MUSC 630. Counterpoint. 3 Credits.

Study of contrapuntal techniques of the Renaissance and Baroque periods through analysis and composition exercises. {Also offered for undergraduate credit - see MUSC 430.}.

MUSC 631. Contemporary Harmonic Techniques. 3 Credits.

Study of harmonic and contrapuntal techniques of contemporary composers, with exercises in writing in the various styles. {Also offered for undergraduate credit - see MUSC 431.}.

MUSC 634. Analytical Techniques. 3 Credits.

Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor. {Also offered for undergraduate credit - see MUSC 434.}.

MUSC 641. Symphonic Literature. 2 Credits.

Survey of the history of symphonic literature with emphasis on selected works. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 441.}.

MUSC 642. Opera Literature. 2 Credits.

Survey of the history of opera with emphasis on selected works. Prereq: consent of instructor. {Also offered for undergraduate credit - see MUSC 442.}.

MUSC 643. Keyboard Literature. 3 Credits.

Survey of keyboard styles, instrumental development, and literature (excluding organ) from the early 14th century through the 21st century, with special emphasis on works from 1775-1925. May be repeated. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 443.}.

MUSC 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

MUSC 701. Psychology Of Music. 3 Credits.

Study of acoustics, the anatomy and physiology of hearing, and how the listener perceives music and sound.

MUSC 702. Graduate Theory Survey. 3 Credits.

This course is structured as a theory review course for graduate students in music. It will enable students to be able to do advanced course work in analytical studies and other technical graduate courses.

MUSC 703. Foundations of Music Education. 3 Credits.

This course is designed to provide a comprehensive view of the basic foundations inherent in the study of music education at the graduate level, with the emphasis on the development of a personal philosophical perspective that accounts for historical, philosophical, practical and sociological perspectives. Prereq: admission to the Master of Music program.

MUSC 704. Graduate Music History Survey. 3 Credits.

Reading, discussion and listening assignments covering music from the Medieval period through the 21st Century.

MUSC 705. Graduate Diction Survey I. 2 Credits.

A survey of diction training in English and Italian.

MUSC 706. Graduate Diction Survey II. 2 Credits.

A survey of diction training in German and French.

MUSC 709. Graduate Ensemble. 1 Credit.

Ensemble registration for graduate students. Study and performance of major works of each ensemble. May be repeated.

MUSC 713. Advanced Choral Music Methods. 3 Credits.

Advanced study of current choral music methods, materials and assessment strategies. The course will focus on implementation of teaching strategies into choral music classrooms to increase student learning and understanding. Additional information and resources will be studied and used to develop effective secondary music curriculum guidelines. Prereq: admission to graduate studies in music.

MUSC 714. Advanced Elementary Music Methods. 3 Credits.

Advanced study of current elementary music methodologies and the implementation of teaching strategies into elementary music classrooms. Additional information and resources will be studied and used to develop effective elementary music curriculum guidelines. Prereq: admission to the Master of Music in Music Education program.

MUSC 715. History of Choral Literature. 3 Credits.

A survey of the history of choral literature from the Renaissance to the present, with special emphasis on representative compositions in both large and small forms.

MUSC 721. Advanced Vocal Pedagogy. 3 Credits.

In-depth study of the physical and physiological considerations of vocal technique with application to specific voices and suitable repertoire. May be repeated.

MUSC 722. Applied Instrumental Pedagogy. 1-3 Credits.

Advanced study of the physical and physiological considerations of instrumental technique with application to specific instruments and suitable repertoire. May be repeated.

MUSC 723. Advanced Piano Pedagogy. 3 Credits.

Solutions to common pedagogical issues encountered in teaching standard repertoire to advanced-level piano students. May be taught individually. Prereq: MUSC 423 or MUSC 623 and MUSC 424 or MUSC 624.

MUSC 724. Topics in Piano Pedagogy. 1-3 Credits.

In-depth study of a specific area of piano pedagogy based on the needs and interests of the student. May be taught individually. Prereq: MUSC 723. May be repeated for credit.

MUSC 731. Applied Study. 1-4 Credits.

Private applied music study (instrumental, keyboard, vocal, conducting). Course credit determined by program and recommendation of instructor. May be repeated.

MUSC 733. Choral Studies and Pedagogy. 2 Credits.

Topics in advanced choral pedagogy, historical performance practice, graduate level applied conducting and other choral studies will be explored. This course may be repeated once by MM students and up to 3 times by DMA choral conducting students. Prereq: admission to the MM or DMA in choral conducting.

MUSC 734. Analytical Techniques. 3 Credits.

Analysis of music of all periods, using a variety of techniques. Music to be analyzed will vary with each offering; may be repeated with permission of instructor.

MUSC 735. Music Theory Pedagogy I. 3 Credits.

Organization, goals, and procedures for teaching music theory and ear training to undergraduates, with an emphasis on ear training. Topics include: choice and sequencing of topics, pacing of courses, supplementary materials, educational philosophies, and the relevance of theory, ear training, and analysis to performance. Restrictions: Students must be admitted as a graduate student in the Challey School of Music in good academic standing.

MUSC 736. Music Theory Pedagogy II. 3 Credits.

Organization, goals, and procedures for teaching music theory and ear training to undergraduates, with an emphasis on written theory. Topics include: choice and sequencing of topics, pacing of courses, supplementary materials, educational philosophies, and the relevance of theory, ear training, and analysis to performance. Prereq: Students must have successfully passed either 1) the theory portion of the graduate diagnostic exam or 2) MUSC 702: Graduate Theory Survey. Restrictions: Students must be admitted as a graduate student in good academic standing.

MUSC 740. Medieval/Renaissance Music History. 3 Credits.

In-depth historical study of Medieval and Renaissance musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 741. Baroque and Classical Music History. 3 Credits.

In-depth historical study of Baroque and Classical musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 743. Romantic Music History. 3 Credits.

In-depth historical study of Romantic musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 744. 20th Century Music History. 3 Credits.

In-depth study of the 20th century musical language and compositional values and goals through critical listening, score analysis, discussions, and student and instructor presentations.

MUSC 745. Music History Seminar. 3 Credits.

An in-depth aural, interpretational, and factual study of a specific category of composition, style, or composer through individual study, listening, and in-class exchanges of ideas. Restrictions: A graduate student in Music in good standing or by consent of instructor.

MUSC 748. Music Bibliography/Research Methods. 2 Credits.

Introduction to music reference works, general music bibliography, and research methods.

MUSC 750. Studies in Collaborative Piano. 2 Credits.

A comprehensive exposure to the business as well as professional and musical aspects of a collaborative piano career. May be repeated for credit.

MUSC 758. Jazz Methods and Pedagogy in Music Education. 3 Credits.

Exploration of the historical and creative components of jazz; methodologies for beginning implementation of jazz into the music classroom; and beginning to advanced techniques for performance groups will be identified.

MUSC 760. Medieval/Renaissance Choral Literature. 3 Credits.

A study of choral literature of the Medieval and Renaissance periods, including major composers, genres, forms, and compositional styles.

MUSC 761. Baroque Choral Literature. 3 Credits.

A study of choral literature of the Baroque period, including major composers, genres, forms, and compositional styles.

MUSC 762. Classical/Romantic Choral Literature. 3 Credits.

A study of choral literature of the Classical and Romantic periods, including major composers, genres, forms, and compositional styles.

MUSC 763. Contemporary Choral Literature. 3 Credits.

A study of choral literature of the 20th and 21st centuries, including major composers, genres, forms and compositional styles.

MUSC 764. Applied Instrumental Literature. 1-3 Credits.

Advanced study of historically significant repertoire for the student's applied instrument. Repertoire will include, but not be limited to, solo and chamber works, as well as orchestral excerpts. May be repeated.

MUSC 765. Band Literature:History and Development. 3 Credits.

Historical survey of instrumental literature for wind band, covering repertoire from the Renaissance to the present.

MUSC 766. Band Literature:Chamber Music,Other Genres. 3 Credits.

Survey of instrumental literature for wind band, covering music for young bands, wind band and voice, wind band and solo instruments, chamber music, and other genres.

MUSC 767. Vocal Literature I-Baroque/Classical. 3 Credits.

Performance and research-based study of the vocal literature of the Baroque and Classical eras, including national trends and performance practice.

MUSC 768. Vocal Literature II-Romantic. 3 Credits.

Performance and research-based study of the vocal literature of the Romantic era (1800-1915), including national trends and performance practice.

MUSC 769. Vocal Literature III-20Th Century/Contemporary. 3 Credits.

Performance and research-based study of the vocal literature from 1915 to present, including national trends and performance practice.

MUSC 770. Topics in Keyboard Literature. 1-3 Credits.

In-depth study of a specific area of keyboard literature based on the needs and interests of the student. May be taught individually. May be repeated for credit.

MUSC 771. Orff Schulwerk Level I. 3 Credits.

An introduction to the teaching philosophy, techniques and classroom application of the basic Orff methodology. Students participate in recorder study and movement skills each day while studying the elements of music including improvisation.

MUSC 772. Orff Schulwerk Level II. 3 Credits.

An in-depth study of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. Prereq: MUSC 771.

MUSC 773. Orff Schulwerk Level III. 3 Credits.

Pedagogical study for classroom integration of the teaching philosophy, technique and classroom application of the Orff-Schulwerk methodology. Students further develop their knowledge of classical forms, modes, compositions, recorder study, orchestration techniques and movement skills each day while studying the elements of music including improvisation. May be repeated. Prereq: MUSC 771, MUSC 772.

MUSC 780. Recital. 2-4 Credits.

Preparation and presentation of a professional full-length recital in instrument, keyboard, vocal, or conducting performance, with accompanying document. May be repeated for credit.

MUSC 789. D.M.A. Thesis. 1-4 Credits.

Preparation of a capstone written document for the Doctor of Musical Arts degree. At least three registrations required for the Music Education track. At least one registration required for the Performance and Conducting tracks. Restricted to Doctor of Musical Arts program students only.

MUSC 790. Graduate Seminar. 1-5 Credits.**MUSC 791. Temporary/Trial Topics. 1-5 Credits.****MUSC 793. Individual Study/Tutorial. 1-5 Credits.****MUSC 794. Practicum. 1-8 Credits.****MUSC 796. Special Topics. 1-5 Credits.**

Natural Resources Management (NRM)

NRM 150. Natural Resource Management Orientation. 1 Credit.

Introduction to natural resources management issues, concepts, and careers.

NRM 199. Special Topics. 1-5 Credits.**NRM 225. Natural Resources & Agrosystems. 3 Credits.**

Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with RNG 225.

NRM 264. Natural Resource Management Systems. 3 Credits.

General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and SOIL 264.

NRM 291. Seminar. 1-3 Credits.**NRM 322. Environmental Law and Policy. 3 Credits.**

This course explores selected environmental laws with discussions of federal, state, and local laws; management of natural resources via regulatory policies; and the legal system including levels of government, types of law, and mechanisms for regulating externalities. Prereq: Junior standing.

NRM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NRM 391. Seminar. 1-3 Credits.**NRM 394. Individual Study. 1-5 Credits.****NRM 397. Fe/Coop Ed/Internship. 1-4 Credits.****NRM 401. Urban-Ecosystem Management. 3 Credits.**

An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for graduate credit - see NRM 601.}.

NRM 402. River and Stream Resource Management. 3 Credits.

The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for graduate credit - see NRM 602.}.

NRM 420. Sustainable Scenarios in Natural Resources Management. 3 Credits.

An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for graduate credit - see NRM 620.}.

NRM 421. Environmental Outreach Methods. 3 Credits.

Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for graduate credit - see NRM 621.}.

NRM 431. National Environmental Policy Act & Environmental Impact Assessment. 3 Credits.

The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment.; introduction to EIS (Environmental Impact Statements). {Also offered for graduate credit - see NRM 631.}.

NRM 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with RNG and SOIL. {Also offered for graduate credit - See NRM 652.}.

NRM 453. Rangeland Resources Watershed Management. 3 Credits.

Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Prereq: RNG 136 or NRM 225. Cross-listed with RNG 453. {Also offered for graduate credit - see NRM 653.}.

NRM 454. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with RNG 454 and SOIL 454. F (even years) {Also offered for graduate credit - see NRM 654.}.

NRM 456. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Prereq: RNG 136. Cross-listed with RNG and SOIL. {Also offered for graduate credit - See NRM 656.}.

NRM 462. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with RNG and SOIL. {Also offered for graduate credit - see NRM 662.}.

NRM 491. Seminar. 1-5 Credits.**NRM 493. Undergraduate Research. 1-5 Credits.****NRM 494. Individual Study. 1-5 Credits.****NRM 496. Field Experience. 1-15 Credits.****NRM 499. Special Topics. 1-5 Credits.****NRM 601. Urban-Ecosystem Management. 3 Credits.**

An interdisciplinary management survey examining the urban/rural interface and environmental and social factors driving the process of urbanization as a sustainable ecosystem. {Also offered for undergraduate credit - see NRM 401.}.

NRM 602. River and Stream Resource Management. 3 Credits.

The structure and function of river and stream ecosystems: biotic and abiotic functioning, stream and river ecological theories, management and monitoring practices. {Also offered for undergraduate credit - see NRM 402.}.

NRM 620. Sustainable Scenarios in Natural Resources Management. 3 Credits.

An interdisciplinary course to investigate the key competencies needed for sustainable social-ecological systems and how sustainable scenarios can be built for the future management of natural resources. {Also offered for undergraduate credit - see NRM 420.}.

NRM 621. Environmental Outreach Methods. 3 Credits.

Introduction to philosophies, theories, and methods common to environmental education and outreach. {Also offered for undergraduate credit - see NRM 421.}.

NRM 631. National Environmental Policy Act & Environmental Impact Assessment. 3 Credits.

The interaction and effects of the National Environmental Policy Act (NEPA) with national environmental policy; implementation of the NEPA; public opinion on the state of the environment; introduction to EIS (Environmental Impact Statements). {Also offered for undergraduate credit - see NRM 431.}.

NRM 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with RNG and SOIL. {Also offered for undergraduate credit - See NRM 452.}.

NRM 653. Rangeland Resources Watershed Management. 3 Credits.

Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Cross-listed with RNG 653. {Also offered for undergraduate credit - see NRM 453.}.

NRM 654. Wetland Resource Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see NRM 454.}.

NRM 656. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with RNG and SOIL. {Also offered for undergraduate credit - See NRM 456.}.

NRM 662. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with RNG and SOIL. {Also offered for undergraduate credit - see NRM 462.}.

NRM 690. Graduate Seminar. 1-3 Credits.**NRM 695. Field Experience. 1-15 Credits.****NRM 696. Special Topics. 1-5 Credits.****NRM 701. Terrestrial Resources Management. 3 Credits.**

Management and ecology of heterogeneous landscapes where ecosystem processes and human activities interact as dynamic components. Prereq: BOT 660 and BOT 754.

NRM 702. Natural Resources Management Planning. 3 Credits.

Presentation of the principles, practices and key policy issues of natural resources management and planning.

NRM 720. Natural Resource Administration & Policy. 2 Credits.

A comprehensive analysis of the theory of externalities and their application to the design of natural resources policy. Prereq: ECON 681, NRM 702.

NRM 761. Current Issues in Natural Resource Management. 1 Credit.

The class will survey current issues in natural resource management. The survey will provide a way to stimulate critical thinking on those issues.

NRM 790. Graduate Seminar. 1-3 Credits.**NRM 791. Temporary/Trial Topics. 1-5 Credits.****NRM 792. Graduate Teaching Experience. 1-6 Credits.****NRM 793. Individual Study. 1-5 Credits.****NRM 794. Practicum. 1-10 Credits.****NRM 795. Field Experience. 1-15 Credits.****NRM 796. Special Topics. 1-5 Credits.****NRM 797. Master's Paper. 1-3 Credits.****NRM 798. Master's Thesis. 1-10 Credits.****NRM 892. Graduate Teaching Experience. 1-6 Credits.****NRM 895. Field Experience. 1-15 Credits.****NRM 899. Doctoral Dissertation. 1-15 Credits.**

New Institutional Social Science (NISS)

NISS 701. Survey of New Institutional Social Science. 1 Credit.

Introduction to institutional perspectives in economics, political science, psychology, and sociology. Prereq: Acceptance into the New Institutional Social Science certificate program.

NISS 710. Workshop in New Institutional Social Science. 3 Credits.

Workshop incorporating multiple methodologies with a focus on developing research topics that include institutional analysis. Capstone experience for the graduate certificate in New Institutional Social Science. Prereq: NISS 701, ECON 762, POLS 762 and either PSYC 670 or SOC 733.

Nursing (NURS)

NURS 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will be introduced to campus and learn skills and techniques used by successful college students.

NURS 194. Individual Study. 1-5 Credits.

NURS 196. Field Experience. 1-15 Credits.

NURS 199. Special Topics. 1-5 Credits.

NURS 210. Orientation to Research and Evidence-Based Practice. 2 Credits.

This course will introduce quantitative and qualitative types of research and various types of evidence used to support nursing practice. Techniques for searching databases will be integrated and the research process will be introduced. Prereq: admission to the professional nursing program.

NURS 250. Health Promotion. 2 Credits.

Introduction to community as client and setting for nursing practice. Focus on theory and methods of health promotion and teaching-learning. Introduction to providing culturally sensitive care. Prereq: Admission to program.

NURS 251. Skills and Concepts for Nursing. 2 Credits.

Introduction to the nursing process, basic nursing skills and clinical decision-making. Prereq: NURS 250 and admission to program.

NURS 252. Gerontologic Nursing. 2 Credits.

This course focuses on health, the deviations of health, and the nursing care of the geriatric population. Prereq: NURS 250 and admission to program.

NURS 289. Transition from Associate LPN to BSN. 2 Credits.

The course is designed to assist returning students in the transition back to school. The course will examine the role of the RN and provide an in-depth review of the nursing process.

NURS 291. Seminar. 1-3 Credits.

NURS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 294. Individual Study. 1-5 Credits.

NURS 299. Special Topics. 1-5 Credits.

NURS 300. Pharmacology & Pathophysiology for Nursing. 4 Credits.

Principles of pharmacology and pathophysiology are presented in an integrated manner to provide a basis for study of prototype medications in major drug classifications. Emphasis is given to the nursing role in developing a comprehensive approach to the clinical application of drug therapy through the use of the nursing process. Prereq: NURS 252 and NURS 360. Co-req: NURS 342.

NURS 326. Immersion I. 1 Credit.

Introduction to the RN to BSN online program expectations as well as support services available to each student, portfolio introduction, and team building. This course is a hybrid course. The class will meet for 1.5 days at the NDSU Fargo site and additional course work will be completed individually by the student online. Prereq: Licensed as a Registered Nurse and admitted to the RN to BSN Track.

NURS 341. Foundations of Clinical Nursing. 3 Credits.

This course emphasizes the physiologic, psychologic, and pathophysiologic concepts that provide the foundation for professional nursing care. Prereq: NURS 251, NURS 360, CHEM 117, CHEM 117L, BIOC 260. Co-req: NURS 342 and NURS 300.

NURS 342. Adult Health Nursing I. 5 Credits.

This course emphasizes the etiology, pathophysiology, and the nursing care of adult clients experiencing common disorders of body systems. Prereq: NURS 251, NURS 360, BIOL 220, BIOL 220L, BIOL 221, BIOL 221L, MICR 202, MICR 202L, HNES 250, PSYC 250 or HDFS 230. Co-req: NURS 341 and NURS 300.

NURS 346. NDSU RN to BSN Immersion II. 1 Credit.

Face-to-face immersion for introduction to the semester's courses, guest speakers with nursing expertise in specialty areas, systems thinking simulation, portfolio update, and team-building workshop. Co-req: NURS 386, NURS 388.

NURS 352. Family Nursing I. 4 Credits.

This course focuses on nursing care and health promotion for the childbearing family, and includes identification and care of high-risk clients. Prereq: NURS 300, NURS 341 and NURS 342.

NURS 356. The Essence of Nursing. 3 Credits.

This course will explore the current health care environment with special emphasis on patient-centered care, ethics, professionalism and therapeutic communication. This course is offered completely online. The duration of the course is 8 weeks. Co-req: NURS 326, NURS 420.

NURS 360. Health Assessment. 4 Credits.

Focuses on health assessment and health promotion of individual clients through utilization of the nursing process and basic nursing concepts. Prereq: NURS 210, NURS 250.

NURS 362. Family Nursing II. 4 Credits.

Focuses on nursing care of the child and family as client. Includes infancy through adolescence, hospitalized and within the community, acutely ill and chronically ill; common stressors throughout the growing years; strategies for health promotion. Prereq: NURS 300, NURS 341, NURS 342, and PSYC 250; or NURS 300, NURS 341, NURS 342, HDFS 230, HDFS 320, and HDFS 340.

NURS 366. Quality and Safety in Nursing. 3 Credits.

This course focuses on the nurse's role in providing safe, quality health care in health systems. Prereq: Students must be accepted into the RN to BSN program and have finished the first and second semester of the program.

NURS 372. Expanded Family Nursing I. 2 Credits.

Builds upon prior learning and knowledge about obstetrical and neonatal nursing care with an increased emphasis on advanced concepts including labor & childbirth, complications of childbearing, and common female reproductive conditions. Prereq: NURS 360. Co-req: NURS 374.

NURS 374. Expanded Family Nursing II. 2 Credits.

Provides the student an opportunity to integrate prior learning and knowledge about pediatric nursing care with an increased emphasis on growth and development, family dynamics, health promotion, and cultural influences. Prereq: NURS 360. Co-req: NURS 372.

NURS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NURS 382. Clinical Applications. 1 Credit.

This course provides nursing practice experiences to enhance problem solving, critical thinking, and communication skills. Prereq: NURS 300, NURS 341, NURS 342. Co-req: NURS 352.

NURS 386. Chronicity Throughout the Lifespan I. 3 Credits.

This course will examine the impact of chronic health conditions on the client, the family, society and the health care system. Co-req: NURS 346, NURS 388.

NURS 388. Chronicity Throughout the Lifespan II. 3 Credits.

Students will explore the most common chronic diseases and treatment, including implications for clients, families, society, and health care systems. Co-req: NURS 346, NURS 386.

NURS 391. Seminar. 1-3 Credits.

NURS 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 394. Individual Study. 1-5 Credits.

NURS 397. Fe/Coop Ed/Internship. 1-4 Credits.

NURS 399. Special Topics. 1-5 Credits.

NURS 402. Mental Health Nursing. 4 Credits.

Synthesis and application of nursing and psychiatric-mental health concepts to promote the wellness of individuals and groups. Prereq: NURS 352, NURS 362.

NURS 403. Adult Health Nursing II. 1-5 Credits.

Focuses on the etiology, pathophysiology, and nursing care of adult clients experiencing selected clinical problems originating from respiratory and cardiovascular systems, neuro trauma, and multisystem problems. Care of families of clients is also emphasized. Prereq: NURS 352, NURS 362.

NURS 404. Adult Health III. 4 Credits.

The etiology, pathophysiologic mechanisms, and organization of nursing care of adult clients experiencing selected complex stressors. Prereq: NURS 342, NURS 403 and admission to program.

NURS 405. Psychsocial Nursing. 2 Credits.

In this course the student will synthesize prior learning with further exploration of psychosocial nursing. Prereq: Licensure as practical nurse, admission to program.

NURS 406. Community & Public Health Nursing. 4 Credits.

The focus of this course will include the core functions of public health, partnering with the community, primary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Prereq: NURS 250, NURS 402, NURS 403 or NURS 289 and NURS 360.

NURS 407L. Expanded Clinical Practice for the LPN-BSN. 3 Credits.

This course focuses on the etiology, pathophysiologic mechanisms, and mental health aspects of nursing care for patients in a variety of settings including medical/surgical, critical care, labor and delivery and simulation. Prereq: NURS 372 and NURS 407.

NURS 407. Adult Health: Complex Problems. 3 Credits.

Designed for persons with a nursing license, this course focuses on the etiology, pathophysiologic mechanisms, and organization of nursing care for adult clients experiencing selected complex stressors. Prereq: NURS 360.

NURS 410. Research and Redesign. 2 Credits.

A study of the research process. Emphasis is placed on critically evaluating nursing research and utilizing research for evidence-based practice. Discussion about quality improvement principles prepares the nurse to participate in redesign. Prereq: NURS 210, NURS 342, NURS 360 and admission to the professional nursing program.

NURS 420. Evidence-Based Practice and Research in Nursing. 3 Credits.

This course will introduce the research process with the emphasis on developing skills as a consumer of research. Students will gain knowledge in the areas of research methods, critical appraisal of research, and the concepts of evidence-based practice. Prereq: NURS 289 or NURS 356. RN to BSN: Co-req: NURS 326 and NURS 356.

NURS 422. Contemporary Issues in Mental Health Nursing. 2 Credits.

This elective course is designed to increase awareness of contemporary issues in mental health nursing, with emphasis on psychiatric disorders in the general hospital, interpersonal violence, addiction, and emotional intelligence. Prereq: admission to the professional Nursing program.

NURS 426. NDSU RN to BSN Immersion III. 1 Credit.

Face-to-face immersion with introduction to the semester's courses, guest speakers to address nursing roles in the community, portfolio update, and team building projects. Co-req: NURS 446, NURS 446L, NURS 436.

NURS 436. Transcultural Nursing Care. 3 Credits.

Nursing 436 Transcultural Nursing will explore the effects of race and culture on life patterns with special emphasis on health care and health care practices. The course is offered completely online. Duration of the course is eight weeks. Co-req: NURS 426, NURS 446, NURS 446L.

NURS 446. Population Focused Nursing Care. 3 Credits.

The focus of this course will include the core functions of public health, partnering with the community, primary and secondary prevention, creation of healthy environments, service to those at risk, stewardship of resources, and multidisciplinary collaboration. Co-req: NURS 426, NURS 446L, NURS 436.

NURS 446L. Population Focused Nursing Care - Clinical. 1 Credit.

This course will provide students the opportunity to collaborate with public health agencies or community sites to implement principles of population-focused care. The experience can be arranged in the student's residence community. Co-req: NURS 426, NURS 446, NURS 436.

NURS 450. Nursing Synthesis/Practicum. 4 Credits.

NURS 450 is the capstone course in the nursing major and provides a framework for the student's transition to the entry-level professional role. 1 credit didactic, 3 credits clinical. Prereq: CHP 400, NURS 250, NURS 251, NURS 252, NURS 341, NURS 342, NURS 352, NURS 360, NURS 362, NURS 402, NURS 403 and NURS 460 and admission to program. Co-req: NURS 404, NURS 406.

NURS 456. RN to BSN Immersion IV. 1 Credit.

Face-to-face immersion for introduction to the semester's courses. Guest speakers to introduce advancing to master's or doctorate degrees, portfolio update, and leadership workshop. Co-req: NURS 426, NURS 462, NURS 462L.

NURS 460. Management, Leadership and Career Development. 3 Credits.

This course focuses on the study of management and leadership concepts and issues in professional nursing. This course will also incorporate a guide for career development. Prereq: NURS 342 or NURS 360.

NURS 462. Nurses as Leaders. 3 Credits.

This online course focuses on the study of leadership and management concepts and issues in professional nursing. Co-req: NURS 456, NURS 462L, NURS 478.

NURS 462L. Nursing Leadership Practicum. 1 Credit.

Students will develop a capstone project to improve an aspect of health care, utilizing knowledge from previous courses, including research, and evidence-based practice, leadership, quality and safety. Co-req: NURS 456, NURS 462, NURS 478.

NURS 478. BSN Capstone. 3 Credits.

Students will develop a capstone project to improve an aspect of health care, utilizing knowledge from previous courses, including research and evidence-based practice, leadership, quality and safety. Co-req: NURS 456, NURS 462, NURS 462L.

NURS 479. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

NURS 491. Seminar. 1-5 Credits.**NURS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 494. Individual Study. 1-5 Credits.**NURS 496. Field Experience. 1-15 Credits.****NURS 499. Special Topics. 1-5 Credits.****NURS 679. Global Seminar. 1-6 Credits.****NURS 690. Graduate Seminar. 1-3 Credits.****NURS 692. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

NURS 695. Field Experience. 1-15 Credits.**NURS 696. Special Topics. 1-5 Credits.****NURS 715. Population Health/Epidemiology for Advanced Practice Nursing. 3 Credits.**

Epidemiologic techniques, reporting, and research will be presented. Emphasis is placed on disease prevention and control. Health problems of national and international significance will be examined and strategies for solutions and/or management will be proposed.

NURS 790. Graduate Seminar. 1-3 Credits.**NURS 791. Temporary/Trial Topics. 1-5 Credits.****NURS 793. Individual Study. 1-5 Credits.****NURS 794. Practicum. 1-8 Credits.****NURS 795. Field Experience. 1-15 Credits.****NURS 796. Special Topics. 1-5 Credits.****NURS 797. Master's Paper. 1-3 Credits.****NURS 798. Master's Thesis. 1-10 Credits.****NURS 801. Theoretical Perspectives of the Discipline. 2 Credits.**

The course is designed to help the student analyze, critique and apply a variety of nursing theories, models and conceptual frameworks in advanced nursing practice. Incorporation of writing methods emphasized for professional development.

NURS 802. Ethics and Health Policy in Nursing. 2 Credits.

Analyze interactions among common clinical, organizational, societal, and policy decisions from ethical and legal perspectives. Evaluates selected theories and models of decision making and health care.

NURS 804. Nursing Research/Evidence Based Practice. 3 Credits.

Exploration of methodologies of scholarly inquiry in nursing with an emphasis on the utilization of evidenced based practice in the advanced nursing practice role.

NURS 806. Health Care Delivery Systems and Financing. 2 Credits.

Analysis of health care system and financial management for measurement of patient outcomes are the focus of this course. Advanced practice nurses play a leadership role while participating in system decisions including monitoring financial information and promoting quality improvement in managing and utilizing health care.

NURS 808. Informatics in Advanced Nursing Practice. 2 Credits.

Course focuses on the various information and communication technology tools used in the care of patients, communities, and populations. Provides an understanding on how to use information to gather data, create information, and generate knowledge in the delivery of care among providers, patients, and all system levels.

NURS 810. Health Promotion and Disease Prevention. 2 Credits.

This course critically examines patterns of health behaviors, risk assessment, lifestyles, developmental stages, sociocultural, psychological, and spiritual contributions to well-being. Includes data-based assessment and management of preventive health services and common acute and chronic conditions.

NURS 812. Advanced Health Assessment. 3 Credits.

Performance of health histories, complete physical/psychosocial assessments, and developmental assessments of clients from across the lifespan. A laboratory component is included.

NURS 812P. Assessment Practicum. 6 Credits.

In this course the student integrates health history, physical examination and laboratory evaluations in a plan for management of client needs. Prereq: NURS 812.

NURS 814. Advanced Pathophysiology Across the Lifespan I. 2 Credits.

General pathophysiological responses to selected body systems to disease processes are presented from both biological and behavioral perspectives. Emphasis on normal cellular function, developmental changes and common physiological symptoms.

NURS 816. Advanced Pathophysiology Across the Lifespan II. 2 Credits.

Builds on the context from NURS 814 with emphasis on normal cellular function, developmental changes and common physiological symptoms. Synergistic clinical manifestations and total body-mind responses to system alterations. Prereq: NURS 814.

NURS 820. Advanced Practice Roles. 3 Credits.

This course addresses scope of practice, legal parameters of advanced practice, and leadership in the advanced practice nursing role. Restrictions: Current 3rd status in the NDSU DNP program.

NURS 830. Clinical Applications. 3 Credits.

Student designs individualized study in an area of focus. Options include extension of a scholarly study, extended clinical practice, intensive study of specialized treatment modality and other appropriate foci. Prereq: NURS 634.

NURS 831. Advanced Pharmacology I. 2 Credits.

Information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications.

NURS 832. Advanced Pharmacology II. 2 Credits.

Continuation of information relative to therapeutic management guidelines for treatment of selected disease processes. Drug information by classification and basic principles of pharmacodynamic and pharmacokinetics, clinical uses, mechanisms of action, contraindications, adverse reactions, and client education implications. Prereq: NURS 631.

NURS 833P. Family Primary Care:Residency I. 6 Credits.

Student synthesizes skills acquired in previous didactic and clinical courses to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833.

NURS 833. Family Primary Care I:Assessment and Management. 3 Credits.

Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 812P, NURS 816.

NURS 834. Family Primary Care II:Assessment and Management. 3 Credits.

Clinical decision making skills are fostered in the diagnosis, management, monitoring and evaluation of common acute, emergent, and chronic health conditions. Selected case studies of clients will be examined in relation to problems, diagnoses, plans, and evaluations. Prereq: NURS 833.

NURS 834P. Family Primary Care:Residency II. 6 Credits.

Students synthesize skills acquired in previous didactic and clinical courses, in particular NURS 833P, to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 833P.

NURS 835P. Practicum IV: FNP Role Integration. 6 Credits.

Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 834P.

NURS 835. Family Primary Care III: Assessment and Management. 2 Credits.

Continuation of Family Primary Care I and II. Focus on health promotion, maintenance, restoration and disease prevention. Application of health-related theories, family dynamics, methods of human genetics, research protocols, ethics, cost effectiveness and legal ramifications for advanced nursing practice. Prereq: NURS 834.

NURS 836P. Practicum V: FNP Role Integration. 7 Credits.

Application of skills and clinical experiences in primary care. Didactic concepts are incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, physical examinations, and diagnostic analysis will be integrated into evaluation of clients. Prereq: NURS 835P.

NURS 850P. Family Primary Care: Specialty Practicum. 3 Credits.

Students are immersed into a specialty clinical area and supervised by a healthcare provider with expertise in the specialty. Theory, research, and didactic learning are incorporated in the student's clinical experience. Prereq: NURS 834P.

NURS 880. Interprofessional Collaborative Practice. 2 Credits.

Building on prior learning, graduate nursing students will synthesize and analyze interprofessional skills required to assume the role of provider on the healthcare team, such as communication, collaboration, leadership, conflict resolution, consultations, team building, and roles and responsibilities. Prereq: NURS 820.

NURS 890. Seminar. 1-5 Credits.

NURS 893. Individual Study/Tutorial. 1-5 Credits.

NURS 894. Practicum/Internship. 1-8 Credits.

NURS 899S. Clinical Dissertation. 1-15 Credits.

The clinical dissertation is a scholarly work that focuses on practice issues. It involves identification, development, implementation, and evaluation and/or dissemination of an evidence-based project addressing a current clinical issue. Graded 'S' or 'U'.

Pharmaceutical Sciences (PSCI)

PSCI 194. Individual Study. 1-5 Credits.

PSCI 196. Field Experience. 1-15 Credits.

PSCI 199. Special Topics. 1-5 Credits.

PSCI 291. Seminar. 1-3 Credits.

PSCI 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 294. Individual Study. 1-5 Credits.

PSCI 299. Special Topics. 1-5 Credits.

PSCI 300. Pharmaceutical Organic Chemistry. 5 Credits.

This course provides pre-professional pharmacy students enrolled in the Doctor of Pharmacy Early Admissions Pathway with a comprehensive overview of organic chemistry and related topics relevant to the professional pharmacy curriculum such as structure-activity relationships, drug design, and common pharmaceutical polymers. Prereq: CHEM 121, CHEM 121L, CHEM 122, CHEM 122L. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 301. Biochemistry and Molecular Biology for Pharmacists. 5 Credits.

The primary goal in this course is to ensure that students begin to understand how biological processes occur at the molecular level. Students will also study the structure and function of the molecules of living cells, with an emphasis on proteins in the context of antibiotic and other drug interactions. The course will include an introduction to biomolecules, an examination of the generation and use of metabolic energy, biosynthesis, metabolic regulation, and an introduction of the storage, transmission, and expression of genetic information. Prereq: CHEM 342 or PSCI 300. Restricted to students who have conditional acceptance in the NDSU Doctor of Pharmacy program.

PSCI 367. Pharmaceutical Calculations. 1 Credit.

Qualitative and quantitative principles encompassing calculations performed by pharmacists in traditional and specialized practice settings. Scope includes computations related to prescriptions and medication orders. Restricted to students in the professional Pharmacy program.

PSCI 368. Pharmaceutics I. 3 Credits.

Quantitative and theoretical principles of science applied to the design, preparation, evaluation, use, and therapeutic limitations of various pharmaceutical dosage forms. Biological and physiochemical principles that govern the absorption, distribution, metabolism, and excretion of drug dosage forms in humans. Prereq: Admission to professional program.

PSCI 369. Pharmaceutics II. 2 Credits.

Quantitative and theoretical principles of science applied to the design, preparation, evaluation, use, and therapeutic limitations of various pharmaceutical dosage forms. Biological and physiochemical principles that govern the absorption of drug dosage forms. Prereq: Admission to professional program.

PSCI 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PSCI 391. Seminar. 1-3 Credits.

PSCI 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 394. Individual Study. 1-5 Credits.

PSCI 399. Special Topics. 1-5 Credits.

PSCI 410. Pharmaceutical Biotechnology. 2 Credits.

Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: admission to PharmD program. {Also offered for graduate credit - see PSCI 610.}.

PSCI 411. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.

This course is designed for professional Pharm D students/Graduate Students to learn and understand the basic principles of Pharmacokinetics/ Pharmacodynamics, and then apply them to the patient care setting and scientific research, covering from basic chemical, pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: Admission to PharmD program. {Also offered for graduate credit - see PSCI 611.}.

PSCI 412. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.

Pharmacologic and therapeutic properties of chemotherapeutic agents and anti-infective drugs. Prereq: PSCI 411. {Also offered for graduate credit - see PSCI 612.}.

PSCI 413. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.

The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. Prereq: PHRM 340, PHRM 341, PSCI 411 all with a grade of C or higher. {Also offered for graduate credit - see PSCI 613.}.

PSCI 414. Cardiovascular Pharmacodynamics. 3 Credits.

Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. Prereq: PHRM 340 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 614.}.

PSCI 415. Neuropsychiatry Pharmacodynamics. 3 Credits.

Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. Prereq: PHRM 341 and PSCI 411 both with a grade of C or higher. {Also offered for graduate credit - see PSCI 615.}.

PSCI 417. Pharmacogenomics. 2 Credits.

This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Prereq: Admission to PharmD/graduate PSCI program. {Also offered for graduate credit - see PSCI 617.}.

PSCI 470. Pharmacokinetics. 3 Credits.

Concepts and mathematical techniques for describing the time course of drugs in biological systems. Prereq: PSCI 411 with a grade of C or higher. {Also offered for graduate credit - see PSCI 670.}.

PSCI 491. Seminar. 1-5 Credits.**PSCI 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSCI 494. Individual Study. 1-5 Credits.**PSCI 496. Field Experience. 1-15 Credits.****PSCI 499. Special Topics. 1-5 Credits.****PSCI 545. Clinical Toxicology. 2 Credits.**

Toxic potential of various poisonous substances including mechanism of toxicity, toxic doses, clinical presentation, clinical and laboratory monitoring and their specific treatment. Prereq: PSCI 411.

PSCI 590. Graduate Seminar. 1-3 Credits.**PSCI 593. Individual Study/Tutorial. 1-5 Credits.****PSCI 610. Pharmaceutical Biotechnology. 2 Credits.**

Current and future biotechnologies in drug discovery, design, and production. Diagnostic technologies for individualized patient therapies. Prereq: Accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 410.}.

PSCI 611. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.

This course is designed for professional Pharm D students/Graduate Students to learn and understand the basic principles of Pharmacokinetics/ Pharmacodynamics, and then apply them to the patient care setting and scientific research, covering from basic chemical, pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: Admission into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 411.}.

PSCI 612. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.

This is a basic pharmacology course. The chemical structure, medicinal and pharmacological properties of therapeutic agents used in the treatment of cancerous and infectious diseases will be covered in this course. Aspects of microbiology, molecular and cell biology, physiology, immunology and pharmacology related to understanding the therapeutic use of these agents will be discussed. Prereq: accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 412.}.

PSCI 613. Endocrine/Respiratory/GI Pharmacodynamics. 3 Credits.

The pharmacological properties and therapeutic uses of therapeutic agents for the treatment of disorders of the endocrine and GI systems, autonomic nervous system, and anti-inflammation agents, will be covered in this course. Prereq: Admission into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 413.}.

PSCI 614. Cardiovascular Pharmacodynamics. 3 Credits.

Pharmacologic properties of drugs used in the treatment of cardiovascular disorders. Prereq: Admission into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 414.}.

PSCI 615. Neuropsychiatry Pharmacodynamics. 3 Credits.

Pharmacological properties of therapeutic agents used in the treatment of central nervous system disorders. Prereq: accepted into PSCI Graduate Program and/or department consent. {Also offered for undergraduate credit - see PSCI 415.}.

PSCI 617. Pharmacogenomics. 2 Credits.

This course provides students with a broad perspective on the emergence of pharmacogenomics as a new field and the potential role of pharmacogenomics in future clinical therapeutics and drug design. Admission into Pharmaceutical Sciences graduate program and/or consent from the Department of Pharmaceutical Sciences. {Also offered for undergraduate credit - see PSCI 417.}.

PSCI 670. Pharmacokinetics. 3 Credits.

Concepts and mathematical techniques for describing the time course of drugs in biological systems. Also includes Toxicology. Prereq: Admission to PSCI Graduate program and/or department consent. {Also offered for undergraduate credit - see PSCI 470.}.

PSCI 690. Graduate Seminar. 1-3 Credits.**PSCI 696. Special Topics. 1-5 Credits.****PSCI 701. Quantative Drug Design. 2 Credits.**

Modeling of drug disposition and receptor binding with focus on rational development of new drugs and elucidation of action mechanisms.

PSCI 703. Drug Metabolism. 2 Credits.

Drug biotransformations and their effects on drug properties such as duration of action, potency, toxicity, and specificity. Prereq: BIOC 702.

PSCI 746. Neuropharmacology. 3 Credits.

Study of action mechanisms of drugs affecting the central and peripheral nervous systems.

PSCI 747. Cardiovascular Pharmacology. 3 Credits.

Study of action mechanisms of drugs affecting the circulatory systems, including their pathology.

PSCI 762. Advanced Biopharmaceutics. 2 Credits.

Stability and kinetic factors involved in absorption, distribution, metabolism, and excretion of drug products.

PSCI 765. Cancer Cell Biology. 2 Credits.

This course covers the principles of modern cancer cell biology, including topics on oncogenes, tumor suppressor genes, growth factors, signal transduction, cell cycle, apoptosis, angiogenesis, and mechanism of tumor metastasis.

PSCI 790. Graduate Seminar. 1-3 Credits.**PSCI 791. Temporary/Trial Topics. 1-5 Credits.****PSCI 793. Individual Study/Tutorial. 1-5 Credits.****PSCI 795. Field Experience. 1-15 Credits.****PSCI 796. Special Topics. 1-5 Credits.****PSCI 798. Master's Thesis. 1-10 Credits.****PSCI 892. Graduate Teaching Experience. 1-6 Credits.****PSCI 899. Doctoral Dissertation. 1-15 Credits.**

Pharmacy Practice (PHRM)

PHRM 170. Common Medicines & Diseases. 2 Credits.

Consumer-oriented introduction to drugs, common dosage forms, usage of common classes of prescription, and over-the-counter drug products. Does not count toward a pharmacy major.

PHRM 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will be introduced to campus and learn skills and techniques used by successful college students.

PHRM 194. Individual Study. 1-5 Credits.**PHRM 196. Field Experience. 1-15 Credits.****PHRM 199. Special Topics. 1-5 Credits.****PHRM 291. Seminar. 1-3 Credits.****PHRM 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHRM 294. Individual Study. 1-5 Credits.**PHRM 299. Special Topics. 1-5 Credits.****PHRM 301. Top Drugs I. 1 Credit.**

Introduction to basic knowledge necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Student will learn brand/generic/indication for all medications on the Top Drug Medication List. Prereq: acceptance into the PharmD program.

PHRM 324. Writing and Professionalization in Pharmacy. 3 Credits.

Study of and practice in language use and written conventions of pharmacy practice and the pharmaceutical sciences. Students practice writing for career development, documenting patient care, evaluating and synthesizing scientific literature, and communicating with patient and professional audiences. Prereq: ENGL 120, junior status, admission to the early admission pathway to the Doctor of Pharmacy program.

PHRM 340. Patient Assessment and Pathophysiology I. 4 Credits.

Introduction to interviewing skills and physical assessment techniques important for assessing patients and monitoring disease states and drug therapy. Comprehensive study of the normal and abnormal physiological processes and the mechanisms of disease important to the understanding of pharmacology and drug therapy. Prereq: Admission to the professional program.

PHRM 341. Pathophysiology II. 3 Credits.

Normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: Admission to the PharmD program.

PHRM 350. Introduction to Pharmacy Practice. 2 Credits.

Issues related to pharmacy practice, patient medication counseling, retrieval of drug information, cultural competency, health literacy, pharmaceutical care plans, and evaluating adverse drug reactions/interactions are discussed. Prereq: Admission to the Professional Pharmacy Program.

PHRM 351L. Pharmacy Practice Laboratory I. 2 Credits.

This course is a hands-on skills laboratory in contemporary pharmacy practice. Learners will engage in activities and simulations which provide opportunities for application of skills relevant to community pharmacy practice. Prereq: Admission to the PharmD program.

PHRM 352. Introduction to Health Care Systems. 2 Credits.

Pharmacy students will be introduced to health professions, health care delivery systems, financing, access, quality, and economic issues. Prereq: Admission to the PharmD program.

PHRM 353. Introduction to Pharmacy and the Health Care System. 3 Credits.

Introduction to the knowledge, skills and attitudes necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Pharmacy students will be introduced to health professions, health care delivery systems, financing, access, quality, and economic issues. Prereq: admission to the PharmD program.

PHRM 355. Institutional Introductory Pharmacy Practice Experience. 3 Credits.

This course is designed to be an introduction to institution based pharmacy practice. This course consists of a 3 week, 120 hour, unpaid, supervised pharmacy practice experience in an institutional pharmacy setting, required assignments, and required reflection. Pass/Fail grading. Prereq: PHRM 400, PHRM 450, PHRM 452L, PHRM 455, PHRM 532, PHRM 534, PHRM 535, PHRM 538, PHRM 565, PSCI 413, PSCI 414, PSCI 415, PSCI 417 and CHP 400.

PHRM 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHRM 391. Seminar. 1-3 Credits.**PHRM 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHRM 394. Individual Study. 1-5 Credits.**PHRM 397. Fe/Coop Ed/Internship. 1-4 Credits.****PHRM 399. Special Topics. 1-5 Credits.****PHRM 400. Top Drugs II. 1 Credit.**

Introduction to basic knowledge necessary for success in the professional pharmacy curriculum and in the practice of pharmacy. Prereq: PHRM 301 with a grade of C or higher.

PHRM 425. Instructional Design for Health Professionals. 2 Credits.

Build basic skills to design and implement effective instructional activities ranging from pharmacy-specific professional education (e.g. patient education, inter-professional medication-related presentations) to college-level instructional tasks. Prereq: PHRM 353 with a grade of C or higher. {Also offered for graduate credit - see PHRM 625.}.

PHRM 450. Self Care. 3 Credits.

Course designed to provide pharmacy students with the knowledge, skills, and practical tools necessary to provide self care recommendations to patients, physicians, nurses, and other allied health care professionals. Prereq: PHRM 340, PHRM 341 both with a grade of C or higher.

PHRM 452L. Pharmacy Practice Laboratory II. 2 Credits.

This course will afford the learner the knowledge, skill set, and resources needed to practice in an institutional setting. Contextualized, competency-based, learning activities are used to promote analytical reasoning and mastery of learning outcomes. Topics include health-system pharmacy; sterile and nonsterile products; compounding; therapeutic plan formulation using electronic health records; point-of-care testing. Prereq: PHRM 351 L with a grade of C or higher.

PHRM 455. Community Introductory Pharmacy Practice Experience. 4 Credits.

This course is designed to be an introduction to community based pharmacy practice. This course consists of a 4 week, 160 hour, unpaid, supervised pharmacy practice experience in a community pharmacy setting, required assignments, and required reflection. Pass/Fail grading. Prereq: PHRM 301, PHRM 340, PHRM 341, PHRM 351 L, PHRM 353, PHRM 480, PSCI 367, PSCI 368, PSCI 369, PSCI 410, PSCI 411, PSCI 412, PSCI 470 and MICR 470.

PHRM 475. Pharmacy Practice Management. 3 Credits.

This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings. Prereq: PHRM 350, PHRM 352, PHRM 452L.

PHRM 479. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHRM 480. Drug Literature Evaluation. 3 Credits.

The goals of this course are to achieve a thorough understanding of the structure of the literature and its inherent strengths and weaknesses, such that the student may evaluate scientific studies and utilize the literature to support a point of view. Prereq: Admission to professional program.

PHRM 491. Seminar. 1-5 Credits.**PHRM 492. Study Abroad. 1-15 Credits.****PHRM 494. Individual Study. 1-5 Credits.****PHRM 499. Special Topics. 1-5 Credits.****PHRM 500. Top Drugs III. 1 Credit.**

Students will build on drug knowledge they have obtained from PHRM 400 to be successful in the practice of pharmacy. Prereq: PHRM 400 with a grade of C or higher.

PHRM 520. Special Populations. 3 Credits.

Focused on providing pharmaceutical care for a variety of populations including men, women, pediatric and geriatric patients. Prereq: PHRM 532, PHRM 537 and PHRM 538, all with a grade of C or better. {Also available for graduate credit - See PHRM 620.}.

PHRM 532. Infectious Disease. 3 Credits.

This course is a clinical, patient-oriented approach to infectious disease. The instructors will review antimicrobial agents combined with specific infectious disease processes and therapies to help the students make appropriate judgments on infectious disease problems. Prereq: MICR 470, PSCI 412. {Also offered for graduate credit - see PHRM 632.}.

PHRM 534. Rheumatology/Endocrinology/Gastrointestinal. 3 Credits.

Pharmacotherapy of disorders involving the musculoskeletal, endocrine, and gastrointestinal systems. Prereq: PSCI 413 with a grade of C or higher.

PHRM 535. Hematology and Oncology. 3 Credits.

This course provides a framework for understanding the role molecular biology plays in the pathophysiology and treatment of the most prevalent oncologic and hematologic malignancies, as well as benign and drug-induced hematologic conditions. Students will apply evidence-based principles in assessing/monitoring appropriate therapy for these patients. Prereq: PSCI 410, PSCI 412 both with a grade of C or higher.

PHRM 536. Neurology & Psychiatry Pharmacotherapy. 3 Credits.

The course will focus on the principles, selection and management of pharmacotherapy for the major psychiatric and neurologic diseases. Learning methods will include face-to-face lecture, in-class discussion, small group activities, and case formulations. Prereq: PSCI 415. {Also offered for graduate credit - see PHRM 636.}.

PHRM 537. Renal Disease/Fluid and Electrolytes. 2 Credits.

This course focuses on pathophysiology and pharmacotherapy of major renal diseases including fluid and electrolyte disorders, acid/base balance, and renal replacement therapy. Emphasis is placed upon application of knowledge to patient care situations and the mastery of pharmacotherapy. Prereq: PSCI 414 with a grade of C or higher.

PHRM 538. PTDI: Cardiovascular and Pulmonary Diseases. 4 Credits.

Pharmacotherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases. Prereq: PSCI 413 and PSCI 414.

PHRM 540. Public Health for Pharmacists. 3 Credits.

Pharmacy students will be introduced to public health services, health disparities, emergency preparedness, epidemiology, behavioral health, health promotion, and global health. Prereq: PHRM 352.

PHRM 545L. Pharmacotherapy Laboratory. 1 Credit.

This is a problem-based and skills-based laboratory integrating the pathophysiology, pharmacology, and therapeutic aspects of various diseases in order to prepare learners to make sound patient-centered therapeutic decisions and provide clinical rationale during the pharmacist's patient care process. The class activities are designed as a team-based approach. Prereq: PHRM 450, PHRM 532, PHRM 534, PHRM 538 completed with a grade of C or higher. Co-req: PHRM 536, PHRM 537.

PHRM 546. Advanced Topics in Neuropsychiatry: Major Neurocognitive Disorders. 2 Credits.

The course will provide the most up-to-date information regarding advanced care and management of patients with select major neurocognitive disorders, previously known as dementia. In addition, reversible causes of cognitive problems will be discussed. Prereq: PHRM 341 and PHRM 536.

PHRM 551L. Pharmacy Practice Laboratory III. 2 Credits.

This course is a hands-on skills laboratory course in contemporary pharmacy practice. Learners will engage in activities and simulations which provide hands-on practice of ambulatory care learning topics in various practice settings. Prereq: PHRM 452L with a grade of C or higher.

PHRM 552L. Pharmacy Practice Laboratory IV. 2 Credits.

Coursework will assist Doctor of Pharmacy candidates to develop competence in recognizing, analyzing, and resolving drug related problems; providing accurate drug information and education; promoting public health and managing a patient oriented pharmacy practice. Prereq: PHRM 551L and PHRM 545L both with a grade of C or higher.

PHRM 553. Pharmacy-Based Point-of-Care Testing Certificate Program. 1 Credit.

To provide students with the knowledge of assessment, testing, follow-up care and management principles necessary to operate a successful point-of-care testing program in community pharmacies. Successful completion of the course will result in a National Association of Chain Drug Stores Point of Care Testing Certificate. This course is a combination of live lectures and home study material. Prereq: PHRM 452L and PHRM 532 with a grade of C or higher.

PHRM 560. Specialty Care Topics. 2 Credits.

This course will provide knowledge of specialty topics encountered in pharmacy practice. Prereq: PHRM 537, PHRM 538 both completed with a grade of C or higher.

PHRM 565. Pharmacy-Based Immunization Delivery. 1 Credit.

This course will provide knowledge of immunology, vaccine-preventable diseases, indications for vaccination, and implementation and maintenance of a pharmacy-based vaccination program. Prereq: MICR 470.

PHRM 570. Pharmacy Practice Improvement and Project Management. 2 Credits.

Students will gain a basic understanding of performance improvement and projects they may be expected to complete on a rotation or as a new practitioner. Prereq: PHRM 353 (or PHRM 350 and PHRM 352) and PHRM 480 with a Grade of C or better.

PHRM 572. Pharmacy Law and Ethics. 3 Credits.

Pharmaceutical jurisprudence, including state and federal laws and ethical issues concerned with the practice of pharmacy. Prereq: PHRM 350, PHRM 352, PHRM 452L all with a grade of C or higher.

PHRM 575. Pharmacy Management. 3 Credits.

This course introduces students to management techniques applicable to the contemporary practice of pharmacy in community and institutional settings. Prereq: PHRM 350, PHRM 352, PHRM 452L all completed with a grade of C or higher.

PHRM 576. Essentials for Pharmacist Licensure I. 1 Credit.

Part 1 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Registration by permit only. Prereq: PHRM 500, PHRM 520, PHRM 540, PHRM 545L, PHRM 552L, PHRM 560, PHRM 570, PHRM 572, PHRM 575, PHRM 580 all with a grade C or higher.

PHRM 577. Essentials for Pharmacist Licensure II. 2 Credits.

Part 2 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Enrollment is by permission only. Prereq: PHRM 576.

PHRM 578. Essentials for Pharmacist Licensure III. 2 Credits.

Part 3 of a comprehensive self-directed plan designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum in preparation for national pharmacist licensing examinations. Enrollment by permit only.

PHRM 580. Pharmacotherapy Capstone. 3 Credits.

Using clinical practice guidelines, current scientific literature, and pharmacotherapy concepts, students will evaluate integrated patient case scenarios. Prereqs: A grade of C or higher in PHRM 532, PHRM 534, PHRM 535, PHRM 536, PHRM 537 and PHRM 538.

PHRM 581. Advanced Pharmacy Practice Experience - Rotation I. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum. Enrollment by departmental permission only.

PHRM 582. Advanced Pharmacy Practice Experience - Rotation II. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum.

PHRM 583. Advanced Pharmacy Practice Experience - Rotation III. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes and values developed through the other components of the curriculum.

PHRM 584. Advanced Pharmacy Practice Experience - Rotation 4. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 585. Advanced Pharmacy Practice Experience - Rotation 5. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 586. Advanced Pharmacy Practice Experience - Rotation 6. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 587. Advanced Pharmacy Practice Experience - Rotation 7. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 588. Advanced Pharmacy Practice Experience - Rotation 8. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 589. Advanced Pharmacy Practice Experience - Rotation 9. 5 Credits.

Experiential clinical training designed to integrate, apply, reinforce, and advance the knowledge, skills, attitudes, and values developed through the other components of the curriculum. Prereq: Successful completion of third professional year. Restrictions: Department permission required.

PHRM 590. Graduate Seminar. 1-3 Credits.**PHRM 593. Individual Study/Tutorial. 1-5 Credits.****PHRM 595. Field Experience. 1-15 Credits.****PHRM 596. Special Topics. 1-5 Credits.****PHRM 620. Special Populations. 3 Credits.**

Focused on providing pharmaceutical care for a variety of populations including men, women, pediatric and geriatric patients. Prereq: PHRM 532, PHRM 537 and PHRM 538, all with a grade of C or better. {Also available for professional credit - See PHRM 520.}.

PHRM 625. Instructional Design for Health Professionals. 2 Credits.

Build basic skills to design and implement effective instructional activities ranging from pharmacy-specific professional education (e.g. patient education, inter-professional medication-related presentations) to college-level instructional tasks. {Also offered for undergraduate credit - see PHRM 425.}.

PHRM 632. Infectious Disease. 3 Credits.

This course is a clinical, patient-oriented approach to infectious disease. The instructors will review antimicrobial agents combined with specific infectious disease processes and therapies to help the students make appropriate judgments on infectious disease problems. Prereq: MICR 470, PSCI 412 both with a grade of C or higher. {Also offered for professional credit - see PHRM 532.}.

PHRM 638. PTDI: Cardiovascular and Pulmonary Diseases. 4 Credits.

Pharmacotherapy of cardiovascular and pulmonary diseases. Study of the pathophysiology, clinical presentation, and treatment of various cardiovascular and pulmonary diseases.

PHRM 696. Special Topics. 1-5 Credits.**PHRM 795. Field Experience. 1-15 Credits.**

Philosophy (PHIL)

PHIL 101. Introduction to Philosophy. 3 Credits.

Basic problems, concepts, and methods of philosophy.

PHIL 111. Professional Responsibility and Ethics. 3 Credits.

The ethical responsibilities of professionals are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 157. Critical Thinking and Informal Logic. 3 Credits.

Through applied informal logic, students are introduced the elements of reasoning, universal intellectual standards, and intellectual traits through readings, discussions, and practical application activities. By examining evidence and arguments, each student consciously develops the critical thinking concepts, skills, and strategies in learning he or she uses every day.

PHIL 194. Individual Study. 1-5 Credits.**PHIL 196. Field Experience. 1-15 Credits.****PHIL 199. Special Topics. 1-5 Credits.****PHIL 210. Ethics. 3 Credits.**

Overview of different types of approaches to ethical dilemmas such as theistic ethics, naturalistic ethics, and situational ethics. Covers the ethical issues confronted in personal, public, and professional life.

PHIL 215. Contemporary Moral Issues. 3 Credits.

Many contemporary moral issues, such as the developed world's duties to the developing world, war, ethical technology, and gender issues are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 216. Business Ethics. 3 Credits.

Many of the central moral issues of business, such as consumer rights, advertising, employee rights, and business competition, are examined in light of the major ethical theories, such as Utilitarianism, Kantianism, and Relativism.

PHIL 221. Indian Philosophical Tradition. 3 Credits.

An introduction to the philosophical tradition of the Indian Subcontinent. The course focuses on the major orthodox (astika) schools of Vedic philosophy, Samkhya, Nyaya, Vaisheshika, Mimamsa, Vedanta, and Yoga, while also discussing the heterodox (nastika) Buddhist, Jain, and Materialist (Carvaka) schools. The course will present the major figures, teachings, and arguments of these schools with a special focus on their metaphysical and ethical views.

PHIL 225. Environmental Ethics. 3 Credits.

An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology.

PHIL 257. Traditional Logic. 3 Credits.

Study of the art and science of critical thinking; scientific method emphasized.

PHIL 291. Seminar. 1-5 Credits.**PHIL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 294. Individual Study. 1-5 Credits.**PHIL 299. Special Topics. 1-5 Credits.****PHIL 321. Ancient Philosophy. 3 Credits.**

Greco-Roman philosophy from pre-Socratics to the Stoics and Epicureans.

PHIL 322. Medieval Philosophy. 3 Credits.

Western philosophy from St. Augustine to Ockham and Marsilius of Padua.

PHIL 323. Modern Philosophy. 3 Credits.

Western philosophy from Descartes to Kant.

PHIL 324. Contemporary Philosophy. 3 Credits.

An overview of the main philosophical thinkers and positions in the contemporary period.

PHIL 327. Ethics, Engineering, and Technology. 3 Credits.

Students will learn a unique and systematic approach to deal with the ethical issues that are increasingly inherent in technology and engineering practice. Using human morality, this course will examine the emergence of advanced technological systems and how they affect our individual and social behaviors, and in return, how they are affected by those behaviors and our shared and individual morality. Students will examine a broad range of ethical topics in design, sustainability and emerging technologies, professional codes of ethics and case studies. Cross-listed with ENGR.

PHIL 356. Ancient Philosophy. 3 Credits.

An overview of the main philosophical thinkers and positions in the ancient world. Among the key thinkers addressed are Socrates, Plato, and Aristotle.

PHIL 357. Augustine. 3 Credits.

Study of Augustine's thought, especially philosophical, in its historical context.

PHIL 359. Thomas Aquinas. 3 Credits.

The philosophy of Thomas Aquinas as a perennial philosophy. Prereq: Junior standing.

PHIL 369. Philosophy of Religion. 3 Credits.

An introduction of the philosophical analysis of the core concepts of religion, focusing on the possible existence and nature of God, understood philosophically as the maximally perfect being.

PHIL 370. Social and Political Philosophy. 3 Credits.

An overview of the key social and political philosophical theories in the western tradition.

PHIL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHIL 391. Seminar. 1-3 Credits.**PHIL 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 394. Individual Study. 1-5 Credits.**PHIL 399. Special Topics. 1-5 Credits.****PHIL 450. Metaphysics. 3 Credits.**

Historical and systematic philosophical study of fundamental principles of reality, especially as concerns the human person.

PHIL 451. Epistemology. 3 Credits.

A detailed study of the philosophical analysis of the nature of knowledge and associated concepts. Prereq: PHIL 257.

PHIL 475. Philosophy of Law. 3 Credits.

Philosophy of law examines the nature of law and law's relationship to other systems of norms, especially ethics and political philosophy. It asks questions such as "What is the basis of law?", "How should laws be interpreted?", "What is the relationship between law and morality?", and "What is justice?".

PHIL 476. History of Philosophy: Modern Period. 3 Credits.

An overview of the main philosophical thinkers and positions in the modern period of western civilization. Among the thinkers addressed are Descartes, Leibniz, Locke, Hume, and Kant.

PHIL 486. Philosophy & Literature. 3 Credits.

Philosophical elements of selected works from Western literature, such as those of Dante, More, Milton, and Newman. Prereq: PHIL 101.

PHIL 487. Aesthetics. 3 Credits.

Principles of aesthetics as revealed by artists, writers, and philosophers.

PHIL 491. Seminar. 1-5 Credits.**PHIL 491H. Seminar. 3 Credits.****PHIL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHIL 494. Individual Study. 1-5 Credits.**PHIL 496. Field Experience. 1-15 Credits.****PHIL 499. Special Topics. 1-5 Credits.****PHIL 625. Environmental Ethics. 3 Credits.**

An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology. {Also offered for undergraduate credit - see PHIL 425.}.

Physics (PHYS)

PHYS 110L. Introductory Astronomy Lab. 1 Credit.

Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulae, galaxies.

PHYS 110. Introductory Astronomy. 3 Credits.

Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulae, galaxies.

PHYS 120L. Fundamentals of Physics Laboratory. 1 Credit.

Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 120. Fundamentals of Physics. 3 Credits.

Application of physics concepts and principles to the real world. Topics selected from mechanics, heat, optics, electricity, and magnetism.

PHYS 171. Introductory Projects in Physics. 1 Credit.

Basic computer controlled instrumentation for automation and data acquisition. Design of simple measurement and control projects covering waveforms, temperature measurement and robotics. Elementary data analysis: curve fitting, Fourier theory and statistics.

PHYS 194. Individual Study. 1-5 Credits.**PHYS 196. Field Experience. 1-15 Credits.****PHYS 199. Special Topics. 1-5 Credits.****PHYS 211L. College Physics I Laboratory. 1 Credit.**

Beginning course for students without a calculus background. Includes basic principles of bodies at rest and in motion, fluids, vibrations, waves, sound and thermodynamics. Prereq: MATH 105. Co-req: PHYS 211.

PHYS 211. College Physics I. 3 Credits.

Beginning course for students without a calculus background. Includes basic principles of bodies at rest and in motion, fluids, vibrations, waves, sound and thermodynamics. Prereq: MATH 105 or higher.

PHYS 212L. College Physics II Laboratory. 1 Credit.

Second course for students without a calculus background. Includes electricity, magnetism, optics and modern physics. Prereq: PHYS 211, PHYS 211L.

PHYS 212. College Physics II. 3 Credits.

Second course for students without a calculus background. Includes electricity, magnetism, optics and modern physics. Prereq: PHYS 211, PHYS 211L.

PHYS 215. Research For Undergraduates. 1-3 Credits.

Special research studies in physics under the supervision of an instructor.

PHYS 251. University Physics I. 4 Credits.

Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq: MATH 165.

PHYS 251R. University Physics I Recitation. 1 Credit.

A recitation that complements PHYS 251 with theory and applications. Coreq: PHYS 251.

PHYS 251L. University Physics I Laboratory. 1 Credit.

Newtonian mechanics of translational and rotational motion, work, energy, power, momentum, conservation of energy and momentum, periodic motion, waves, sound, heat, and thermodynamics. Prereq: MATH 165.

PHYS 252R. University Physics II Recitation. 1 Credit.

A recitation that complements PHYS 252 with emphasis on theory and applications. Coreq: PHYS 252.

PHYS 252L. University Physics II Laboratory. 1 Credit.

Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; waves; optics. Coreq: PHYS 252.

PHYS 252. University Physics II. 4 Credits.

Electric charge, field, potential, and current; magnetic field; capacitance; resistance; inductance; RC, RL, LC and RLC circuits; waves; optics. Prereq: PHYS 251 or ME 222. Coreq: MATH 166.

PHYS 291. Seminar. 1-3 Credits.**PHYS 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 294. Individual Study. 1-5 Credits.**PHYS 299. Special Topics. 1-5 Credits.****PHYS 303. The Science of Learning. 1 Credit.**

This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

PHYS 350. Modern Physics. 3 Credits.

Breakdown of classical physics, special relativity, Bohr model, Schrodinger mechanics of simple systems, atomic structure, selected topics from nuclear and solid state physics. Prereq: PHYS 252, MATH 265.

PHYS 355. Classical Mechanics. 3 Credits.

Basic concepts, single and coupled oscillators, variational calculus, Lagrangian and Hamiltonian dynamics, central force motion, accelerated coordinate systems. Prereq: PHYS 252 and MATH 265. Co-req: MATH 266.

PHYS 360. Modern Physics II. 3 Credits.

Continuation of modern physics covering molecular structure, nuclear physics and solid state physics with an embedded modern physics laboratory with experiments such as atomic and molecular spectroscopy, electron diffraction, nuclear spectroscopy, photoelectric effect and computer simulations of experiments. Prereq: PHYS 350.

PHYS 361. Electromagnetic Theory. 3 Credits.

Electrostatics, magnetostatics, dielectrics, electric circuits, time varying electric and magnetic fields, electromagnetic induction, and application of Maxwell's equations. Prereq: PHYS 252, MATH 266.

PHYS 370. Introduction to Computational Physics. 3 Credits.

Introduction to computational methods, with applications to planetary motion, numerical integration, chaotic oscillations, percolation, random walks, diffusion limited aggregation, molecular dynamics simulation, Monte Carlo methods, and Fourier transforms. 2 lectures, 2 one-hour laboratories. Prereq: PHYS 251, MATH 166 and CSCI 160 or ECE 173. Coreq: PHYS 252.

PHYS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PHYS 391. Seminar. 1-3 Credits.**PHYS 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 394. Individual Study. 1-5 Credits.**PHYS 397. Fe/Coop/Internship. 1-4 Credits.****PHYS 399. Special Topics. 1-5 Credits.****PHYS 411. Optics for Scientists & Engineers. 3 Credits.**

Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Prereq: PHYS 252. Coreq: PHYS 411L. Cross-listed with ECE 411. {Also offered for graduate credit - see PHYS 611.}.

PHYS 411L. Optics for Scientists and Engineers Lab. 1 Credit.

Required laboratory for PHYS 411 or ECE 411. Ten optics experiments plus a major related optics project. Preq: PHYS 252. Coreq: PHYS 411. Cross-listed with ECE 411L. {Also offered for graduate credit - see PHYS 611L.}.

PHYS 413. Lasers for Scientists and Engineers. 3 Credits.

Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Prereq: PHYS 252. Cross-listed with ECE 413. {Also offered for graduate credit - see PHYS 613.}.

PHYS 415. Elements of Photonics. 3 Credits.

Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Prereq: PHYS 252. Cross-listed with ECE 415. {Also offered for graduate credit - see PHYS 615.}.

PHYS 417. Optical Signal Transmission. 3 Credits.

Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Prereq: ECE 351. Cross-listed with ECE 417. {Also offered for graduate credit - See PHYS 617.}.

PHYS 462. Thermal and Statistical Physics. 3 Credits.

Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. Prereq: PHYS 350. {Also offered for graduate credit - see PHYS 662.}.

PHYS 481. Condensed Matter Physics. 3 Credits.

Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). Co-req: PHYS 486. {Also offered for graduate credit - see PHYS 681.}.

PHYS 485. Quantum Mechanics I. 3 Credits.

Operators, one-dimensional wells and barriers, Schrodinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. Prereq: PHYS 350, MATH 266. {Also offered for graduate credit - see PHYS 685.}.

PHYS 486. Quantum Mechanics II. 3 Credits.

Continuation of PHYS 485. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 485. {Also offered for graduate credit - see PHYS 686.}.

PHYS 488. Senior Project I. 1 Credit.

This is the first course of the capstone experience in physics. It results in the proposal of an undergraduate research project that is carried out in the second capstone course. Pass/Fail only. Department consent required.

PHYS 489. Senior Project II. 2 Credits.

This is the second course of the capstone experience in physics. The student carries out the research project proposed in the first capstone course. Prereq: PHYS 488.

PHYS 491. Seminar. 1-5 Credits.**PHYS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PHYS 494. Individual Study. 1-5 Credits.**PHYS 496. Field Experience. 1-15 Credits.****PHYS 499. Special Topics. 1-5 Credits.****PHYS 611. Optics for Scientists & Engineers. 3 Credits.**

Introduction to modern optics. Geometric optics, electromagnetic nature of light, polarization, interference, diffraction, fiber optics. Corequisite laboratory with major related optics project. Coreq: PHYS 611L. Cross-listed with ECE 611. {Also offered for undergraduate credit - see PHYS 411.}.

PHYS 611L. Optics for Scientists and Engineers Lab. 1 Credit.

Required laboratory for PHYS 611 or ECE 611. Ten optics experiments plus a major related optics project. Coreq: PHYS 611. Cross-listed with ECE 611L. {Also offered for undergraduate credit - see PHYS 411L.}.

PHYS 613. Lasers for Scientists and Engineers. 3 Credits.

Lecture and laboratory introduction to lasers. Spontaneous and stimulated transitions, line-broadening, gain, gain saturation, optical resonators, Fabry-Perot interferometers, theory of laser oscillation, rate equations, transverse modes, coherence, and Gaussian beams. Cross-listed with ECE 613. {Also offered for undergraduate credit - see PHYS 413.}.

PHYS 615. Elements of Photonics. 3 Credits.

Analysis of optical systems using the matrix formulation, wave propagation in anisotropic media, electro-optic effect and laser modulation, physical origin of optical non-linearities, phase matching, optical second harmonic and parametric generation. Cross-listed with ECE 615. {Also offered for undergraduate credit - see PHYS 415.}.

PHYS 617. Optical Signal Transmission. 3 Credits.

Optical signal transmission including geometric optics and modal analysis for homogeneous and inhomogeneous light guides. Systems studies including coupling, inter-symbol interference, sources, photodetectors, and modulation. Cross-listed with ECE 617. {Also offered for undergraduate credit - See PHYS 417.}.

PHYS 662. Thermal and Statistical Physics. 3 Credits.

Classical postulates and laws of thermodynamics; cyclic processes and entropy; thermodynamic potentials, equilibrium, stability, and phase transitions; Maxwell-Boltzmann distribution, applications to classical gases and magnets; quantum statistics, Bose-Einstein and Fermi-Dirac distributions, applications to quantum gases. {Also offered for undergraduate credit - see PHYS 462.}.

PHYS 681. Condensed Matter Physics. 3 Credits.

Introduction to the physics of soft condensed matter, composed of polymers, colloids, amphiphiles, and liquid crystals, and of hard condensed matter, including metals, semiconductors, and superconductors, emphasizing phase transitions and materials properties (electrical, magnetic, optical, elastic). {Also offered for undergraduate credit - see PHYS 481.}.

PHYS 685. Quantum Mechanics I. 3 Credits.

Operators, one-dimensional wells and barriers, Schrodinger equation, uncertainty, duality, Born interpretation, unstable states, bosons and fermions, central force problems, angular momentum, spin. {Also offered for undergraduate credit - see PHYS 485.}.

PHYS 686. Quantum Mechanics II. 3 Credits.

Continuation of PHYS 685. Perturbation theory, angular momentum addition, variational schemes, WKB method, scattering theory, time dependent problems. Prereq: PHYS 685. {Also offered for undergraduate credit - see PHYS 486.}.

PHYS 690. Graduate Seminar. 1-5 Credits.

PHYS 696. Special Topics. 1-5 Credits.

PHYS 752. Mathematical Methods in Physics I. 3 Credits.

Review of practical mathematical methods routinely used by physicists, including applications. Focus on differential equations, variational principles, and other selected topics. Cross-listed with MATH 782.

PHYS 753. Mathematical Methods in Physics II. 3 Credits.

Tensor analysis, matrices and group theory, special relativity, integral equations and transforms, and selected advanced topics. Prereq: MATH 629 and MATH 652. Cross-listed with MATH 783.

PHYS 758. Statistical Physics. 3 Credits.

Review of thermodynamics and statistical mechanics; Monte Carlo and molecular dynamics simulation; applications to phase transitions.

PHYS 761. Electromagnetism. 3 Credits.

Review of Maxwell's equations, radiation, collisions between charged particles, dynamics of relativistic particles and fields.

PHYS 771. Quantum Physics I. 3 Credits.

Schrodinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms.

PHYS 772. Quantum Physics II. 3 Credits.

Schrodinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resistance mechanisms. Prereq: PHYS 771.

PHYS 781. Solid State Physics. 3 Credits.

Crystal structure and binding, reciprocal lattices and x-ray diffraction, lattice vibrations, thermal properties, free electron model, band theory, magnetism, superconductivity. Prereq: PHYS 685.

PHYS 782. Condensed Matter Physics. 3 Credits.

An introduction to soft condensed matter, focusing on colloids, polymers, liquid crystals, surfactants, and biological systems. Topics will include characterization of soft materials, interparticle interactions, structure, equilibrium phase behavior, non-equilibrium properties, and practical applications. Prereq: PHYS 663.

PHYS 790. Graduate Seminar. 1-3 Credits.

PHYS 791. Temporary/Trial Topics. 1-5 Credits.

PHYS 793. Individual Study/Tutorial. 1-5 Credits.

PHYS 794. Practicum. 1-10 Credits.

PHYS 796. Special Topics. 1-5 Credits.

PHYS 797. Master's Paper. 1-3 Credits.

PHYS 798. Master's Thesis. 1-10 Credits.

PHYS 899. Doctoral Dissertation. 1-15 Credits.

Plant Pathology (PPTH)

PPTH 194. Individual Study. 1-5 Credits.

PPTH 196. Field Experience. 1-15 Credits.

PPTH 199. Special Topics. 1-5 Credits.

PPTH 291. Seminar. 1-5 Credits.

PPTH 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 294. Individual Study. 1-5 Credits.

PPTH 299. Special Topics. 1-5 Credits.

PPTH 324. Introductory Plant Pathology. 3 Credits.

Etiology, symptomatology and control of representative plant diseases and demonstrations. 2 lectures, 1 laboratory. F.

PPTH 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PPTH 391. Seminar. 1-5 Credits.

PPTH 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 394. Individual Study. 1-5 Credits.

PPTH 399. Special Topics. 1-5 Credits.

PPTH 454. Diseases Of Field and Forage Crops. 3 Credits.

Etiology, symptomatology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (even years) {Also offered for graduate credit - see PPTH 654.}.

PPTH 455. Plant Disease Management. 3 Credits.

Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. Prereq: PPTH 324. S (odd years) {Also offered for graduate credit - see PPTH 655.}.

PPTH 457. Landscape Plant Pathology. 3 Credits.

Tree and turfgrass pathology with emphasis on disease identification and management strategies for a variety of settings. Two lectures and a 2-hour lab. Prereq: PPTH 324. S (odd years). {offered at the graduate level as PPTH 657}.

PPTH 460. Fungal Biology. 3 Credits.

Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. Prereq: BIOL 150, PPTH 324. F (even years) {Also offered for graduate credit - see PPTH 660.}.

PPTH 491. Seminar. 1-5 Credits.

PPTH 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PPTH 494. Individual Study. 1-5 Credits.

PPTH 496. Field Experience. 1-15 Credits.

PPTH 499. Special Topics. 1-5 Credits.

PPTH 654. Diseases Of Field and Forage Crops. 3 Credits.

Etiology, symptomatology, control, and importance of field and forage crop diseases. 2 lectures, 1 laboratory. S (even years) {Also offered for undergraduate credit - see PPTH 454.}.

PPTH 655. Plant Disease Management. 3 Credits.

Diagnosis and control of horticultural crop diseases. 2 lectures, 1 laboratory. S (odd years) {Also offered for undergraduate credit - see PPTH 455.}.

PPTH 657. Landscape Plant Pathology. 3 Credits.

Tree and turfgrass pathology with emphasis on disease identification and management strategies for a variety of settings. Two lectures and a 2-hour lab. S (odd years). {offered at the undergraduate level as PPTH 457}.

PPTH 660. Fungal Biology. 3 Credits.

Fungal ecology, morphology, genetics, physiology, taxonomy, and relevance to humans. 2 lectures, 1 laboratory. F (even years) {Also offered for undergraduate credit - see PPTH 460.}.

PPTH 690. Graduate Seminar. 1-3 Credits.

PPTH 695. Field Experience. 1-15 Credits.

PPTH 696. Special Topics. 1-5 Credits.

PPTH 751. Physiology Of Plant Disease. 3 Credits.

Infection, penetration, recognition, nutrient transfer, toxins, photosynthesis, and physiological materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S (odd years).

PPTH 752. Plant Nematology. 3 Credits.

Nematode morphology, classification, biology, molecular identification and quantification; interaction of nematodes with other pathogens, molecular mechanisms of plant-nematode interactions, and nematode disease management. 2 lectures, 1 two-hour laboratory. F (odd years).

PPTH 754. Plant Disease Epidemiology. 3 Credits.

Temporal and spatial dynamics of diseases and causative pathogens in plant populations. 2 lectures, 1 laboratory. F (even years).

PPTH 755. Population Biology of Plant Pathogens. 3 Credits.

Discussion of the biological processes that affect plant pathogens populations and communities in natural and agricultural settings and how these processes affect disease development and their control.

PPTH 756. Fungicides: Development, Modes of Action, and Development of Resistance. 3 Credits.

The course will provide an understanding of fungicides, their mode of action, the development of resistance, and resistance management strategies.

PPTH 757. Advanced Techniques in Plant Pathology. 3 Credits.

Review of traditional and latest tools and techniques available to conduct research in plant pathology. Two lectures.

PPTH 758. Bacterial, Nematode and Viral Diseases of Plants. 4 Credits.

Biology, epidemiology, and management of plant diseases caused by bacteria, nematodes and viruses.

PPTH 759. Host-Parasite Genetics. 3 Credits.

Host-parasite genetics including genetics of plant and pathogens and gene-for-gene relationships. 3 lectures. S (even years).

PPTH 760. Advanced Mycology. 4 Credits.

Biology and classification of fungi. Emphasis on identification, growth and development, physiology, and etiology of fungi. 2 lectures, 2 laboratories. F (odd years).

PPTH 790. Graduate Seminar. 1-3 Credits.

PPTH 791. Temporary/Trial Topics. 1-5 Credits.

PPTH 792. Graduate Teaching Experience. 1-6 Credits.

PPTH 793. Individual Study/Tutorial. 1-5 Credits.

PPTH 794. Practicum/Internship. 1-10 Credits.

PPTH 795. Field Experience. 1-15 Credits.

PPTH 796. Special Topics. 1-5 Credits.

PPTH 797. Master's Paper. 1-3 Credits.

PPTH 798. Master's Thesis. 1-10 Credits.

PPTH 899. Doctoral Dissertation. 1-15 Credits.

Plant Sciences (PLSC)

PLSC 110. World Food Crops. 3 Credits.

Scientific principles of crop growth, worldwide production, management alternatives, and processing for domestic and international consumption. 2 lectures, 1 discussion, 1 tutorial laboratory. F, S.

PLSC 111. Genetics and You. 2 Credits.

Basic concepts in genetics with emphasis on current human genetics. 2 lectures.

PLSC 150. Introduction to Horticulture Therapy. 3 Credits.

Horticultural therapy involves the use of plants and gardening activities to facilitate mental and physical rehabilitation. Students will become familiar with facilitation techniques, programs, clients, staff, budgets, facilities, equipment, and the various populations that horticulture therapists serve. 2 lectures and 2 lab hours per week.

PLSC 177. Floral Design I. 2 Credits.

History of floral design, care, handling, and identification of fresh cut flowers and dried materials. Use of tools, equipment, and supplies used in the industry and application of basic design styles, holiday designs, and displays. 1 lecture, 1 two-hour laboratory. S.

PLSC 180. Plant Systems Approach to Global Foods. 3 Credits.

This course will focus on fundamental "Plant Systems" concepts and associated metabolic rationale to understand Global Food Systems from agro-ecological foundations. These plant systems concepts, from diverse geographical origins, will be linked to food processing principles and public health relevance as the basis for advancing global food security. Overall the course will advance integrated and systems-based understanding of global challenges to agriculture and food security driven by food crops. 3 lectures.

PLSC 189. Skills for Academic Success. 1 Credit.**PLSC 194. Individual Study. 1-5 Credits.****PLSC 196. Field Experience. 1-15 Credits.****PLSC 199. Special Topics. 1-5 Credits.****PLSC 200. Career Preparation in Plant Sciences. 2 Credits.**

Develop techniques to prepare for successful employment, identify and use resources to search for employment opportunities. Develop effective written and oral communication skills and gain exposure to several avenues of employment and career paths.

PLSC 210. Horticulture Science. 3 Credits.

Principles of plant classification, structure, function, growth, propagation, culture, and use of horticultural crops. Covers vegetable and fruit production in the home garden, growing flowers and planting flower beds, and landscaping principles and materials. 3 lectures. F.

PLSC 211. Horticulture Science Lab. 1 Credit.

Exercises in plant identification, propagation, nutrition, gardening, greenhouses, lawn care, landscape design, interior plants, pruning, and culture of horticultural crops. 1 two-hour laboratory. F.

PLSC 215. Weed Identification. 1 Credit.

Identification of weed seeds and plants from seedling to mature stages. Emphasis on life cycles, common distribution, and family groupings. 1 one and one half-hour laboratory plus time by arrangement. F.

PLSC 219. Introduction to Prairie & Community Forestry. 2 Credits.

Urban and traditional forestry as applied to the Great Plains region, as well as global forests. History, opportunities, and basic interactions of forestry with wildlife, parks and recreation, horticulture, and the ecology of the planet. 2 lectures. F (odd years).

PLSC 225. Principles of Crop Production. 3 Credits.

Principles of field crop production with emphasis on relationships of crops to their climate and production considerations as a means of managing resources and environmental factors. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 110. S.

PLSC 291. Seminar. 1-5 Credits.**PLSC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 294. Individual Study. 1-5 Credits.**PLSC 296. Field Experience. 1-15 Credits.****PLSC 299. Special Topics. 1-5 Credits.****PLSC 307. History and Evolution of Wine in America. 1 Credit.**

Introduction to wines and wine industries from a historical perspective. Include an overview of cultivar selection, cultivation, harvesting, expressing, fermenting, and processing wines for unique characteristics. Wine tasting is needed to link sensory perceptions to wine characteristics. 1 lecture. Students must be at least 21 years old. F.

PLSC 312. Expanding the Boundaries of Learning with Service. 1 Credit.

This course is designed to build on the speaking, writing, interpersonal and team skills, and citizenship of our students. This course uses a service learning approach and can be repeated for credit. S.

PLSC 315. Genetics. 3 Credits.

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 3 lectures. Cross-listed with BIOL 315. F, S.

PLSC 315L. Genetics Laboratory. 1 Credit.

Study of the basis of heredity with emphasis on structure and function of DNA and Mendelian genetics. 1 two-hour laboratory. Cross-listed with BIOL 315L. F, S.

PLSC 320. Principles of Forage Production. 3 Credits.

Introduction to alfalfa and other forage crops and their management, identification, preservation, forage quality characteristics, and use of legumes in rotations. 2 lectures, 1 one-hour laboratory, 1 tutorial by arrangement. Prereq: PLSC 110. F.

PLSC 323. Principles of Weed Science. 3 Credits.

Introduction to biological, chemical, cultural, and mechanical weed control; characteristics of weeds and their identification; pesticides application and dissipation. 2 lectures, 1 discussion, 1 tutorial laboratory. S.

PLSC 335. Seed Technology & Production. 2 Credits.

Techniques involved in production, harvest, and processing of seed. Special attention to maintenance of genetic and mechanical quality during growth, harvesting, and processing. 3 lectures, 2 two-hour laboratories. Prereq: PLSC 110. S/2.

PLSC 340. Grain Grading. 2 Credits.

Description and interpretation of the Grain Standards Act and instruction in grading of grain. 3 lectures, 3 two-hour laboratories. Recommended Prereq: PLSC 225. S/2.

PLSC 341. Landscape Bidding, Contracting and Operations. 2 Credits.

This course presents an overview of the landscaping industry from a business perspective. Students will learn about bidding, business law, employee and customer relations, money management, installation, and maintenance. Two lecture hours per week. S.

PLSC 350. Sugarbeet Production. 2 Credits.

History, growth, and development; soil and fertility management; weeds, insect, and disease control; cultivars; harvesting, storage, and processing of sugarbeets. Prereq: PLSC 110, PLSC 210. F.

PLSC 355. Woody Landscape Plants. 3 Credits.

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants commonly used in the Northern Plains. Field trips. 1 lecture, 2 two-hour laboratories. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. F.

PLSC 365. Herbaceous Landscape Plants. 2 Credits.

Production, identification, and uses of annual, perennial, and bulbous ornamentals in home and public landscapes with consideration to insect and disease problems. 3 one-hour lecture/laboratories. Recommended Coreq: PLSC 210. F (odd years).

PLSC 368. Plant Propagation. 3 Credits.

Principles and practices of seed propagation and of asexual propagation: cuttings, layering division, specialized structures, grafting, budding, and micropropagation. 2 lectures, 1 two-hour laboratory. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S.

PLSC 370. Landscape Management. 3 Credits.

Introduction to basic landscape management principles and practices. Commercial management practices associated with the landscape design/build and maintenance industry are emphasized. F (odd years).

PLSC 375. Turfgrass Management. 3 Credits.

Species characteristics of cool and warm season turfgrasses, including cultural requirements for home lawns, parks, and sports turf. 3 lectures. Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210.

PLSC 375L. Turfgrass Management Laboratory. 1 Credit.

This lab will provide students an opportunity to gain hands-on experience in turf-related topics discussed in the turfgrass management class. 1 two-hour laboratory. Co-req: PLSC 375.

PLSC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PLSC 380. Principles of Plant Physiology. 3 Credits.

Study of plant physiological principles, including photosynthesis, respiration, water and nutrient uptake, plant growth and development, and stress responses, and the relationships between plant physiology and agricultural cultural practice. 3 lectures. S. Prereq: BIOL 150 and BIOL 151.

PLSC 381. Sports Turf Operations. 3 Credits.

Strategic management practices in sports turf and golf course operations, including development of cultural practices adhering to environmental regulations, personnel management, and budgeting. 3 lectures. Prereq: PLSC 375. F.

PLSC 386. Arboriculture Climbing and Rigging Operations. 2 Credits.

Introduction to the basics of tree climbing and rigging focusing on tree hazard assessment, climbing line placement, ascending, descending and moving around in the canopy as well as methods of safely rigging down branches and trunk sections of trees.

PLSC 391. Seminar. 1-5 Credits.**PLSC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 394. Individual Study. 1-5 Credits.**PLSC 397. Cooperative Education. 1-4 Credits.****PLSC 399. Special Topics. 1-5 Credits.****PLSC 411. Genomics. 3 Credits.**

An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. Recommended Prereq: BIOL 150, STAT 330. F {Also offered for graduate credit - see PLSC 611.}.

PLSC 412. Nursery Production and Management. 3 Credits.

Industry overview, production-management practices, facilities, equipment, nursery stock standards, storage, and over wintering. Field trips. 3 lectures. Coreq: PLSC 368. S (odd years).

PLSC 415. Vegetable Crop Production. 2 Credits.

Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. Recommended Prereq: BIOL 150 or BIOL 151; PLSC 210 and PLSC 211. S (odd years). {Also offered for graduate credit - see PLSC 615}.

PLSC 416. Fruit Crop Production. 2 Credits.

Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. Recommended Prereq: BIOL 151, PLSC 210 and PLSC 211. F (even years). {Also offered for graduate credit - see PLSC 616}.

PLSC 422. Greenhouse Production and Management. 3 Credits.

Greenhouse structure and construction, environmental control, plant nutrition, growth regulation, pest control, and business management in relation to commercial production of greenhouse crops, including pot, cut flower, bedding, foliage, and vegetable crops. Field trips. 2 lectures, 1 two-hour laboratory. Recommended Coreq: PLSC 368. S (even years).

PLSC 425. Potato Science. 2 Credits.

History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. Recommended Prereq: BIOL 150, BIOL 151, PLSC 110, and PLSC 210. F/2 (odd years) {Also offered for graduate credit - see PLSC 625}.

PLSC 431. Intermediate Genetics. 3 Credits.

Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 631}.

PLSC 433. Weed Biology and Ecology. 2 Credits.

Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. Prereq: PLSC 380. S (even years).

PLSC 444. Applied Plant Breeding and Research Methods. 3 Credits.

Principles of genetics, experimental design, and crop management applied to conventional and transgenic crop improvement methodologies. Ethical and societal issues will be considered, in addition to technical and economic constraints. F Prereq: PLSC 225, PLSC 315, STAT 330.

PLSC 453. Advanced Weed Science. 2 Credits.

Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. Prereq: PLSC 323. F {Also offered for graduate credit - see PLSC 653}.

PLSC 455. Cropping Systems: An Integrated Approach. 3 Credits.

Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. Recommended Prereq: Senior standing. S {Also offered for graduate credit - see PLSC 655}.

PLSC 457. Horticulture and Turfgrass Systems. 3 Credits.

A problem-solving approach to many facets of horticulture and turfgrass management that addresses important issues such as the environment, ecology, biotechnology, pesticides, employment, and business management. An emphasis will be placed on literature reviews, problem solving and communications. 3 lectures. Recommended Prereq: Senior Standing. S.

PLSC 465. Advanced Landscape Plants. 2 Credits.

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. Prereq: PLSC 355. S (even years) {Also offered for graduate credit - see PLSC 665}.

PLSC 468. Landscape Irrigation Design. 2 Credits.

Students will learn the basic issues of water resources, water management, and irrigation system design. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 468. F (odd years).

PLSC 469. Landscape Irrigation Installation and Management. 2 Credits.

Irrigation system installation, winterization, start-up, troubleshooting, renovation, and drainage. 2 lectures. Prereq: Junior standing. Cross-listed with ASM 469. S (even years).

PLSC 480. Advanced Turfgrass Topics. 3 Credits.

Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. Prereq: PLSC 375. S (even years) {Also offered for graduate credit - see PLSC 680}.

PLSC 484. Plant Tissue Culture and Biotechnology. 3 Credits.

Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. Prereq: PLSC 315. F {Also offered for graduate credit - see PLSC 684}.

PLSC 485. Arboriculture Science. 3 Credits.

Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. Recommended Prereq: PLSC 355. F (even years) {Also offered for graduate credit - see PLSC 685.}.

PLSC 486. Applied Crop Physiology. 3 Credits.

Application of physiological principles on plant growth and development and crop production. 3 lectures. Prereq: PLSC 380. S {Also offered for graduate credit - see PLSC 686.}.

PLSC 491. Seminar. 1-5 Credits.

PLSC 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PLSC 493. Undergraduate Research. 1-5 Credits.

PLSC 494. Individual Study. 1-5 Credits.

PLSC 496. Field Experience. 1-15 Credits.

PLSC 499. Special Topics. 1-5 Credits.

PLSC 611. Genomics. 3 Credits.

An integrated presentation of genome organization, genome sequencing and characterization, comparative genomics, transcriptomics, proteomics, and metabolomics. F {Also offered for undergraduate credit - see PLSC 411.}.

PLSC 615. Vegetable Crop Production. 2 Credits.

Vegetable Crop Production explores the history, classification, culture, physiological principles, post-harvest handling, and marketing of major vegetable crops. 2 lectures. S (odd years). {Also offered for undergraduate credit - see PLSC 415.}

PLSC 616. Fruit Crop Production. 2 Credits.

Principles of tree fruit and small fruit production, emphasizing cool climate production. Plant establishment, pruning and training, harvesting and storage, and physiological, environmental, and cultural control of productivity, fruit quality, and pest damage. F (even years). {Also offered for undergraduate credit - see PLSC 416.}

PLSC 625. Potato Science. 2 Credits.

History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Half semester long course beginning in October. F/2 (odd years) {Also offered for undergraduate credit - see PLSC 425.}

PLSC 631. Intermediate Genetics. 3 Credits.

Expansion of classical and molecular concepts of genetics; basic concepts of Mendelian, quantitative, population, molecular, and evolutionary genetics. 2 lectures. F {Also offered for undergraduate credit - see PLSC 431.}.

PLSC 633. Weed Biology and Ecology. 2 Credits.

Principles of weed biology and ecology including seed biology, phenotypic plasticity, seedbank dynamics, population and community structure and dynamics, interference, invasion biology, gene flow and evolution, biological control, and ecologically based weed management. S (even years) {Also offered for undergraduate credit - see PLSC 433.}.

PLSC 653. Advanced Weed Science. 2 Credits.

Integrated weed control programs for crops, pastures, non-cropland, and aquatic environments. Herbicide formulation and mixtures. Herbicide absorption, translocation, and action. 2 lectures. F {Also offered for undergraduate credit - see PLSC 453.}.

PLSC 655. Cropping Systems: An Integrated Approach. 3 Credits.

Integrative capstone focus on the scientific professional and ethical issues associated with crop production and management practices using decision case studies. 3 lectures. S {Also offered for undergraduate credit - see PLSC 455.}.

PLSC 665. Advanced Landscape Plants. 2 Credits.

Nomenclature, identification, and landscape characteristics of native and introduced deciduous and evergreen woody plants grown in Upper Midwest. Emphasis on cultivar introduction, trademarks/patents, adaptation, and diversity within species. Field trips required. 2 two-hour laboratories. S (even years) {Also offered for undergraduate credit - see PLSC 465.}.

PLSC 680. Advanced Turfgrass Topics. 3 Credits.

Development of the turfgrass industry and the scientific basis of strategic turfgrass management, including relationships between turfgrasses, the environment, management and methodologies in turfgrass research. S (even years) {Also offered for undergraduate credit - see PLSC 480.}.

PLSC 684. Plant Tissue Culture and Biotechnology. 3 Credits.

Principles and techniques of plant tissue culture and genetic manipulation and their applications to plant improvement. Hands-on experience with plant tissue culture and genetic engineering. 2 lectures, 1 two-hour laboratory. F {Also offered for undergraduate credit - see PLSC 484.}.

PLSC 685. Arboriculture Science. 3 Credits.

Tree, shrub, and vine care based on the physiology of shoot and root growth and limitations of the environment. Includes plant and site selection, transplanting, staking, fertilizing, pruning, mulching, and related subjects. 3 lectures. F (even years) {Also offered for undergraduate credit - see PLSC 485.}.

PLSC 686. Applied Crop Physiology. 3 Credits.

Application of physiological principles on plant growth and development and crop production. 3 lectures. S {Also offered for undergraduate credit - see PLSC 486.}.

PLSC 690. Graduate Seminar. 1-3 Credits.**PLSC 695. Field Experience. 1-15 Credits.****PLSC 696. Special Topics. 1-5 Credits.****PLSC 710. Professional Development I. 1 Credit.**

This course introduces students to professional society structure and function, mechanics of data presentation, and written discussion. Assignments will emphasize skills needed to complete a research proposal and prepare a research presentation. F.

PLSC 711. Professional Development II. 1 Credit.

This course emphasizes manuscript preparation, manuscript review, poster development, and grantsmanship. Consideration of professional ethics underlies all topics. S.

PLSC 718. Genetics & Plant Improvement. 3 Credits.

Genetic principles and their application to plant improvement. Crop evolution, chromosome structure, and population dynamics related to crop improvement methodology. Genetically modified plants, their impact on breeding technique, and the release of improved varieties. 3 one-hour lectures. Prereq: PLSC 315 and PLSC 315L. F.

PLSC 721. Genomics Techniques. 2 Credits.

Principles, techniques, and applications of the large-scale analysis of DNA organization and sequence, RNA expression, protein sequence, and structure. Prereq: PLSC 611. S.

PLSC 724. Field Design I. 3 Credits.

Application of various field designs, factorial and split-plot arrangements, orthogonal and non-orthogonal comparisons, models, components of variance, correlation, and regression to biological problems. 3 lectures. Recommended Prereq: STAT 725. F.

PLSC 727. Crop Breeding Techniques. 1 Credit.

Evaluation and practice of breeding methods used to develop superior genotypes in crop species across public and private breeding programs. Understanding why certain breeding techniques are used for adaptation, genetic improvement, and cultivar development. Prereq: PLSC 718, PLSC 724. Recommended prereq: PLSC 710, PLSC 734. SS (odd years).

PLSC 731. Plant Molecular Genetics. 3 Credits.

Molecular aspects of plant genome organization and expression; basic and applied usages of molecular markers and gene transfer techniques. 3 lectures. Prereq: PLSC 631. S (even years).

PLSC 734. Field Design II. 2 Credits.

Application of incomplete block designs, confounding and covariance analyses to biological problems. 2 lectures. Prereq: PLSC 724. S (odd years).

PLSC 741. Cytogenetics. 3 Credits.

This course covers the fundamentals of cytogenetics with an emphasis on molecular aspects of chromosome biology including chromosome structure, organization, behavior/transmission, variation, mapping, engineering, and their relationships with gene expression/regulation, inheritance, and breeding. The genetic network and subcellular processes of cell divisions (mitosis and meiosis) are also covered. In addition, both conventional and modern chromosome technologies and their applications in genome studies will be discussed in this course. 3 lectures. F (even years).

PLSC 749. Applied Plant Molecular Breeding. 3 Credits.

This course provides principles and applications of genomics-assisted plant breeding such as germplasm characterization, molecular marker and gene discovery, marker-assisted selection, and genomic selection. Recommend: PLSC 611. F (odd years). Prereq: PLSC 718.

PLSC 750. Crop Stress Physiology. 3 Credits.

Application of physiological principles to enhancement of stress tolerance in crops. S (odd years) Prereq: PLSC 686.

PLSC 751. Advanced Plant Genetics. 3 Credits.

Advanced topics in plant genetics regarding the study of genetic linkage, marker-assisted selection, statistical analysis and interpretation of genetic data, and the study of the inheritance in autotetraploid species. 3 lectures. Prereq: PLSC 631. S (odd years).

PLSC 753. Action & Fate Of Herbicides. 2 Credits.

Herbicide mode of action and fate of herbicides in plants and soil, physiology of herbicide resistance, and herbicide antidotes. 2 lectures. Prereq: PLSC 653. S (even years).

PLSC 755. Advanced Crop Management Decision Making. 3 Credits.

Problem-based learning approach focusing on the scientific, professional, personal, and ethical issues associated with advanced crop management decision-making. Recommended Prereq: PLSC 655. F (even years).

PLSC 763. Laboratory Methods-Weed Science. 2 Credits.

Chemical, analytical, and physiological methods for determining pesticide residues in soil and ground water; and herbicide absorption, translocation, and metabolism in plants. 2 two-hour laboratories. Prereq: PLSC 653. S (odd years).

PLSC 776. Advanced Plant Breeding. 4 Credits.

Application of genetic principles to improvement of self- and cross-pollinated crops. 4 lectures. Prereq: PLSC 718, PLSC 724. S (odd years).

PLSC 779. Study Abroad: Sustainable Agriculture and Renewable Energies in Europe. 1-3 Credits.

This study abroad course covers the main aspects of sustainable agriculture and renewable energy production in Europe. SS.

PLSC 782. Population and Quantitative Genetics. 4 Credits.

Population and quantitative genetics theories and application to applied plant breeding. Prereq: PLSC 718 and PLSC 724.

PLSC 785. Crop Breeding Programs Management. 2 Credits.

Development of student ability to understand, examine, and evaluate crop breeding and improvement programs. Prereq: PLSC 718, PLSC 724. S (even years).

PLSC 790. Graduate Seminar. 1-3 Credits.

PLSC 791. Temporary/Trial Topics. 1-5 Credits.

PLSC 792. Graduate Teaching Experience. 1-6 Credits.

PLSC 793. Individual Study/Tutorial. 1-5 Credits.

PLSC 794. Practicum. 1-8 Credits.

PLSC 795. Field Experience. 1-15 Credits.

PLSC 796. Special Topics. 1-5 Credits.

PLSC 797. Master's Paper. 1-3 Credits.

PLSC 798. Master's Thesis. 1-10 Credits.

PLSC 892. Graduate Teaching Experience. 1-6 Credits.

PLSC 899. Doctoral Dissertation. 1-15 Credits.

Political Science (POLS)

POLS 110. Introduction to Political Science. 3 Credits.

Problems of political science as a discipline, political systems, and political behavior. Includes causes and consequences of individual and group political behavior.

POLS 115. American Government. 3 Credits.

Principles of American government, political behavior, and institutions.

POLS 120. Terrorism. 3 Credits.

Examination of problems of terrorism. Includes its historical perspectives; terrorist motivations, organizations, tactics, strategies; role of media; government responses; future trends, prospects.

POLS 194. Individual Study. 1-5 Credits.

POLS 196. Field Experience. 1-15 Credits.

POLS 199. Special Topics. 1-5 Credits.

POLS 210. Current Politics. 3 Credits.

Study of current national and state political issues.

POLS 215. Problems and Policies In American Government. 3 Credits.

Study of the functioning of American government focusing on the policy process.

POLS 216. Campaigns and Elections. 3 Credits.

Examination of political campaigns and elections with special emphasis for voting behavior, history and theory of political advertising, and effectiveness/ethics of negative advertising. Prereq: POLS 115.

POLS 220. International Politics. 3 Credits.

Concepts, theories, and issues in international relations.

POLS 225. Comparative Politics. 3 Credits.

Comparative analysis of contemporary political systems, practices, institutions, and actors.

POLS 230. Judicial Process. 3 Credits.

Role of lawyers, judges, and courts in the political system. Special emphasis on judicial decision-making and the ideas behind law.

POLS 231. Law and Society. 3 Credits.

Examines the history, types, and sources of law, and the interaction between law, government, and society.

POLS 240. Political Ideologies. 3 Credits.

Study of ideas, belief systems, and basic principles of ideologies.

POLS 291. Seminar. 1-5 Credits.**POLS 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 294. Individual Study. 1-5 Credits.**POLS 299. Special Topics. 1-5 Credits.****POLS 315. Federal Law Enforcement and Crime Policy. 3 Credits.**

Examination of the history, development, current make-up, and jurisdiction of federal law enforcement in the United States, as well as the role of the federal government in setting national crime policy and the strategies employed. Crps-listed with CJ.

POLS 325. Applied Research Methods. 3 Credits.

This course provides an overview of the scientific model, the philosophy and goals of science, and a detailed study of qualitative and quantitative methodologies. Lecture. Co-req or Prereq: STAT 330. Cross-listed with CJ 325.

POLS 350. Gender Issues and the Law. 3 Credits.

This course examines gender differentiations reflected in the U.S. law from both the historical and contemporary perspectives and the impact of that differentiation, particularly on women, in the areas of employment, education and family law.

POLS 351. Women and Politics. 3 Credits.

Study of women leaders; their roles and perspectives within a national and international framework.

POLS 360. Principles of Public Administration. 3 Credits.

Empirical study of public administrators in their diverse roles and functions.

POLS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

POLS 391. Seminar. 1-5 Credits.**POLS 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 394. Individual Study. 1-5 Credits.**POLS 397. Fe/Coop Ed/Internship. 1-15 Credits.****POLS 399. Special Topics. 1-5 Credits.****POLS 420. Political Behavior-Executive-Legislative Process. 3 Credits.**

Behavioral study of executives and legislators with emphasis on examination of empirical data. {Also offered for graduate credit - see POLS 620.}.

POLS 421. Political Behavior-Political Parties. 3 Credits.

Behavioral study of political leaders with emphasis on examination of empirical data. Prereq: admission to the Political Science professional program. {Also offered for graduate credit - see POLS 621.}.

POLS 422. State and Local Politics. 3 Credits.

This course is designed to guide students through a discovery of American politics at the sub-national level. From a comparative perspective, students examine differences between states in terms of their political structures, behavior, and environments. Prereq: POLS 110 or POLS 115, at least junior standing and admission to the Political Science professional program. {Also offered for graduate credit - see POLS 622.}.

POLS 423. Public Policy Analysis. 3 Credits.

Provides an overview of public policy analysis, from development to implementation to evaluation. Students explore these skills through the in-depth examination of one or two current public policy issues. Prereq: Political Science majors or minors only.

POLS 430. Constitutional Law-Civil Liberties. 3 Credits.

Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed. Prereq: at least junior standing {Also offered for graduate credit - see POLS 630.}.

POLS 431. Constitutional Law-Criminal Justice. 3 Credits.

Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel. {Also offered for graduate credit - see POLS 631.}.

POLS 432. Crime and Public Policy. 3 Credits.

Examines the legal, political, public welfare, and social bases and implications of public safety governance implemented by federal, state, and local courts and bureaucracies.

POLS 442. Global Policy Issues. 3 Credits.

Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics. {Also offered for graduate credit - see POLS 642.}.

POLS 444. International Law. 3 Credits.

Examines the history and foundation of the international legal system, including custom, treaties, jurisdiction, and the relationship between international and municipal law. Prereq: POLS 220. {Also offered for graduate credit - see POLS 644.}.

POLS 445. Ethnic Conflicts. 3 Credits.

Explores numerous topics and cases related to ethnic conflicts, including the nature of ethnic identity, the causes of ethnic conflicts, and ethnic conflict prevention/resolution. {Also offered for graduate credit - see POLS 645.}.

POLS 446. International Criminal Law. 3 Credits.

Examines international criminal law. Topics will include war crimes, crimes against humanity, genocide, aggression, and other related issues. Prereq: POLS 220 or POLS 225.

POLS 450. Politics of the Developing Countries. 3 Credits.

Comparative examination of the government and politics of developing countries. Attention is given to special economic and cultural circumstances facing the political systems of these countries. {Also offered for graduate credit - see POLS 650.}.

POLS 451. Politics of the Industrialized Countries. 3 Credits.

Comparative study of government and politics in the industrialized countries including the analysis of legislative and executive branches, parties, bureaucracies, constitutions, policies, and voting behavior. {Also offered for graduate credit - see POLS 651.}.

POLS 452. Comparative Political Economy. 3 Credits.

Comparative study of the relationship between politics and the economy in industrialized and developing countries. Topics include elections, trade, development, investment, redistribution, and the political business cycle. {Also offered for graduate credit - see POLS 652.}.

POLS 453. Environmental Policy and Politics. 3 Credits.

Course is designed to provide students with both a general and advanced understanding of environmental issues. Will examine philosophical underpinnings informing environmental policy making as well as analyze various substantive environmental issues in US. {Also offered for graduate credit - see POLS 653.}.

POLS 454. Comparative Democratic Institutions. 3 Credits.

This course examines the emergence, evolution, and functioning of political institutions across democracies. Topics include party systems, presidential and parliamentary regimes, legislative organization, electoral systems, and bureaucratic structures.

POLS 489. Senior Seminar. 3 Credits.

Capstone experience. Emphasis on integrative skills needed to interrelate the concepts of the discipline.

POLS 491. Seminar. 1-5 Credits.**POLS 491H. Seminar. 1-3 Credits.****POLS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 494. Individual Study. 1-5 Credits.**POLS 496. Field Experience. 1-15 Credits.****POLS 499. Special Topics. 1-5 Credits.****POLS 593. Indiv Study/Tutorial. 1-5 Credits.****POLS 620. Political Behavior-Executive-Legislative Process. 3 Credits.**

Behavioral study of executives and legislators with emphasis on examination of empirical data. {Also offered for undergraduate credit - see POLS 420.}.

POLS 621. Political Behavior-Political Parties. 3 Credits.

Behavioral study of political leaders with emphasis on examination of empirical data. {Also offered for undergraduate credit - see POLS 421.}.

POLS 622. State and Local Politics. 3 Credits.

This course is designed to guide students through a discovery of American politics at the sub-national level. From a comparative perspective, students examine differences between states in terms of their political structures, behavior, and environments. {Also offered for undergraduate credit - see POLS 422.}.

POLS 630. Constitutional Law-Civil Liberties. 3 Credits.

Examination of First Amendment rights including freedom of speech, press, religion, association, and assembly. Due process and equal protection concerns are also addressed. {Also offered for undergraduate credit - see POLS 430.}.

POLS 631. Constitutional Law-Criminal Justice. 3 Credits.

Study of Fourth, Fifth, and Sixth Amendment rights. Emphasis on the law of arrest, search and seizure, self-incrimination, and right to counsel. {Also offered for undergraduate credit - see POLS 431.}.

POLS 642. Global Policy Issues. 3 Credits.

Analysis of the impact of planetary limits to growth, increasing globalization of the world economy, and changing control over resource systems on global politics. {Also offered for undergraduate credit - see POLS 442.}.

POLS 644. International Law. 3 Credits.

Examines the history and foundation of the international legal system, including custom, treaties, jurisdiction, and the relationship between international and municipal law. {Also offered for undergraduate credit - see POLS 444.}.

POLS 645. Ethnic Conflicts. 3 Credits.

Explores numerous topics and cases related to ethnic conflicts, including the nature of ethnic identity, the causes of ethnic conflicts, and ethnic conflict prevention/resolution. {Also offered for undergraduate credit - see POLS 445.}.

POLS 650. Politics of the Developing Countries. 3 Credits.

Comparative examination of the government and politics of developing countries. Attention is given to special economic and cultural circumstances facing the political systems of these countries. {Also offered for undergraduate credit - see POLS 450.}.

POLS 651. Politics of the Industrialized Countries. 3 Credits.

Comparative study of government and politics in the industrialized countries including the analysis of legislative and executive branches, parties, bureaucracies, constitutions, policies, and voting behavior. {Also offered for undergraduate credit - see POLS 451.}.

POLS 652. Comparative Political Economy. 3 Credits.

Comparative study of the relationship between politics and the economy in industrialized and developing countries. Topics include elections, trade, development, investment, redistribution, and the political business cycle. {Also offered for undergraduate credit - see POLS 452.}.

POLS 653. Environmental Policy and Politics. 3 Credits.

Course is designed to provide students with both a general and advanced understanding of environmental issues. Will examine philosophical underpinnings informing environmental policy making as well as analyze various substantive environmental issues in US. {Also offered for undergraduate credit - see POLS 453.}.

POLS 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

POLS 696. Special Topics. 1-5 Credits.**POLS 720. Theoretical Perspectives to the Study of Political Science. 3 Credits.**

Designed to guide beginning graduate students through the dominant paradigms and emerging subject areas of political science scholarship.

POLS 762. New Institutionalism in Political Science. 3 Credits.

This course surveys the new institutionalist literature in political science and examines applications of rational choice theory, and its extensions, to problems of politics and governance, while drawing on both theoretical and empirical research at the intersection of economics and political science.

POLS 797. Master's Paper. 1-3 Credits.

Precision Agriculture (PAG)

PAG 115L. Introduction to Precision Agriculture Lab. 1 Credit.

This laboratory course is designed to teach students Precision Ag hands on experiences include drone flying, precision ag mapping, field visit and ag robotic demonstration. Co-req: PAG 115.

PAG 115. Introduction to Precision Agriculture. 2 Credits.

This course is designed to introduce the student to a broader view of the precision agriculture, crop and livestock production in precision agriculture, fundamental concepts of GIS, GPS, sensors, drones, data acquisition and management, Remote sensing. The course is offered in 3 fifty mins lectures per week. Co-req: MATH 103.

PAG 191. Seminar. 1-5 Credits.**PAG 215. Mapping of Precision Ag Data. 3 Credits.**

This course is designed to introduce the student to principles and applications of mapping data in precision agriculture, GIS, GPS, sensors, drones, data acquisition and management. The course is offered in two 50 mins lectures and one 100-minute laboratory per week. Prereq: PAG 115.

PAG 315. Electronic Systems in Precision Ag. 3 Credits.

This course is designed to introduce the student to understand the basics of electronic systems and applications in precision ag. The students will learn topics like signal processing, electric motor, serial control and communications data network for tractors and machinery for agriculture applications. The course is offered in two 50 mins lectures and one 100 mins laboratory per week. Prereq: PAG 215.

PAG 394. Individual Study. 1-5 Credits.**PAG 454. Applications of Precision Agriculture. 3 Credits.**

The course is designed to introduce students to current technologies that are being used for crop production, and how to use the data collected by them to make more informed crop management decisions. The course is offered as two 50-minute lectures and one lab meeting per week. Prereq: PAG 215. {Also offered for graduate credit - See PAG 654.}.

PAG 455. Applications of Big Data in Precision Agriculture. 3 Credits.

The course is designed to introduce students to basics concepts regarding big data, how big data relates to precision agriculture, and how big data analysis approaches are using precision agriculture related data to enhance crop management and production. The course is offered as two 50-minute lectures and a 2.5 hour lab per week. Prereq: PAG 215.

PAG 496. Field Experience/Practicum. 1-15 Credits.**PAG 654. Applications of Precision Agriculture. 3 Credits.**

The course is designed to introduce students to current technologies that are being used for crop production, and how to use the data collected by them to make more informed crop management decisions. The course is offered as two 50-minute lectures and one lab meeting per week. {Also offered for undergraduate credit - See PAG 454.}.

PAG 690. Seminar. 1-5 Credits.

Psychology (PSYC)

PSYC 111. Introduction to Psychology. 3 Credits.

Survey of the scientific study of behavior and mental processes.

PSYC 189. Skills for Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

PSYC 194. Individual Study. 1-5 Credits.**PSYC 196. Field Experience. 1-15 Credits.****PSYC 199. Special Topics. 1-5 Credits.****PSYC 210. Human Sexuality. 3 Credits.**

Survey of biological, developmental, and psychological aspects of human sexuality. Prereq: PSYC 111.

PSYC 211. Introduction To Behavior Modification. 3 Credits.

Basic principles and procedures governing acquisition, maintenance, and change of behavior, emphasizing human applications. Laboratory involves designing, implementing, and reporting an individual project. Prereq: PSYC 111.

PSYC 212. Psychological Aspects of Drug Use and Abuse. 3 Credits.

Examination of legal and illegal psychoactive drugs. Emphasis on psychological, physiological, and behavioral effects of these drugs and problems of drug abuse. Prereq: PSYC 111.

PSYC 214. Social Interaction. 3 Credits.

Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with SOC 214.

PSYC 216. Cultural Psychology. 3 Credits.

Examines the different ways in which cultural variables affect human cognition, emotion, and behavior. This course uses the lens of culture to consider topics such as cognition and emotion, personality, psychopathology, the self, prejudice and intergroup relations, and cultural conflict (e.g., terrorism, genocide). Prereq: PSYC 111.

PSYC 221. Psychology Applied to Work. 3 Credits.

Applications of psychology to people at work. Topics include employee selection, job interviewing, performance appraisal, psychological testing, Equal Employment Opportunity, leadership, motivation, job satisfaction, organizational theory, employee safety and health. Prereq: PSYC 111.

PSYC 250. Developmental Psychology. 3 Credits.

Survey of the psychology of human life span development. Coverage also includes heredity and prenatal development. Prereq: PSYC 111.

PSYC 260. Introduction to Neuroscience. 3 Credits.

An introduction to behavioral neuroscience with an emphasis on what we know about human brain function and what it means for studying and understanding complex human behavior.

PSYC 261. Introduction to Cognitive Psychology. 3 Credits.

An introduction to the scientific study of human cognition covering topics including perception, attention, memory, language, reasoning, problem solving, and intelligence. Prereq: PSYC 111.

PSYC 270. Abnormal Psychology. 3 Credits.

Survey of the classification, symptoms, and etiology of psychological disorders. Attention given to diagnosis, etiology, and treatment according to prominent theoretical perspectives. Focus on empirical basis for understanding these problems. Prereq: PSYC 111.

PSYC 280. Introduction to Health Psychology. 3 Credits.

Describes the interaction of psychology and health, including the ways in which thoughts, emotions, and behavior influence one's health. Prereq: PSYC 111.

PSYC 291. Seminar. 1-5 Credits.**PSYC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 294. Individual Study. 1-5 Credits.**PSYC 299. Special Topics. 1-5 Credits.****PSYC 322. Judgment & Decision-Making. 3 Credits.**

Covers the functional uses of critical thinking. Focuses on uses in problem solving and decision-making. Applications are directed at both personal and professional concerns. Prereq: PSYC 111.

PSYC 340. Psychology in Sport. 3 Credits.

This is a survey course outlining the applications of psychological theory to sport settings. Prereq: PSYC 111.

PSYC 350. Research Methods I. 3 Credits.

This course teaches scientific method and analysis of data for the social and behavioral sciences. Students completing this course will gain an understanding of descriptive and inferential analyses, including correlation, group comparisons, and non-parametric techniques. Prereq: PSYC 111, MATH 103 or MATH 104 or higher.

PSYC 351. Research Methods II. 3 Credits.

Experimental and quasi-experimental designs in psychological research. Laboratory includes performance of experiments, data analysis, and preparation of research reports. Prereq: PSYC 350.

PSYC 370. Forensic Psychology. 3 Credits.

Broad overview of the interactions of psychology and the law, including current areas of practice, assessment, and forensic techniques. Special focus upon psychology as applied to and affected by family, civil, and criminal law. Prereq: PSYC 270.

PSYC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PSYC 380. Clinical Psychology. 3 Credits.

Introduction to the science and practice of clinical psychology. Includes a survey of the assumptions on which clinical methods are based and an overview of clinical assessment and treatment techniques. Prereq: PSYC 270.

PSYC 381. Understanding Suicide and its Impact. 3 Credits.

Overview of current understanding of the dynamics of suicide and its impact upon people left behind following the death.

PSYC 382. Self-Injury: Recognition & Treatment. 3 Credits.

Overview of the current understanding of the dynamics of self injurious behavior, of the prevalence of various types of harmful behavior, and of the populations most at risk.

PSYC 385. Psychology on Film. 3 Credits.

Many important issues and topics in psychology have been portrayed in feature films and documentaries. Movies and associated readings present significant concepts, persons, and historical events in psychology. Primary focus is on clinical psychology. Prereq: PSYC 111.

PSYC 391. Seminar. 1-5 Credits.**PSYC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 394. Individual Study. 1-5 Credits.**PSYC 397. Coop/Internship. 1-5 Credits.****PSYC 399. Special Topics. 1-5 Credits.****PSYC 440. Experimental Methods. 3 Credits.**

Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer.

Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 640.}.

PSYC 450. Computational Methods in Experimental Psychology. 3 Credits.

An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 650.}.

PSYC 453. Organizational Psychology. 3 Credits.

Survey of topics related to application of psychology to organizational settings. Emphasis on the theoretical bases of individual (leadership, decision making) and social (influence, work group) factors involved in work behavior. 12 credits in psychology and/or management recommended. Prereq: Junior standing. {Also offered for graduate credit - see PSYC 653.}.

PSYC 457. Managing Work Motivation and Morale. 3 Credits.

An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work.

Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. Prereq: PSYC 111. {Also offered for graduate credit - see PSYC 657.}.

PSYC 460. Sensation & Perception. 3 Credits.

Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 660.}.

PSYC 461. Memory And Knowledge. 3 Credits.

Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 661.}.

PSYC 463. Experimental Developmental Psychology. 3 Credits.

Examination of historical and contemporary theory and research in cognitive development. Topics include development of visual processing, language skills, concepts, and social cognition, with particular emphasis on methods of investigating psychological development. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 663.}.

PSYC 464. Attention & Thinking. 3 Credits.

Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 664.}.

PSYC 465. Psychobiology. 3 Credits.

Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351 or PSYC 260. {Also offered for graduate credit - see PSYC 665.}.

PSYC 468. Personality. 3 Credits.

Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 668.}.

PSYC 470. Experimental Social Psychology. 3 Credits.

Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. Prereq: PSYC 351. {Also offered for graduate credit - see PSYC 670.}.

PSYC 471. The Psychology Of Aging. 3 Credits.

Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. Prereq: PSYC 111, Junior standing. {Also offered for graduate credit - see PSYC 671.}.

PSYC 472. Advanced Psychopathology. 3 Credits.

In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. Prereq: PSYC 270, Junior standing. {Also offered for graduate credit - see PSYC 672.}.

PSYC 473. Child Psychopathology and Therapy. 3 Credits.

Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. Prereq: PSYC 270 or PSYC 351. {Also offered for graduate credit - see PSYC 673.}.

PSYC 480. History & Systems. 3 Credits.

Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. Prereq: PSYC 351 or Senior standing. {Also offered for graduate credit - see PSYC 680.}.

PSYC 481. Health Psychology. 3 Credits.

Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. Prereq: PSYC 350 or PSYC 260. {Also offered for graduate credit - see PSYC 681.}.

PSYC 486. Neuropsychology. 3 Credits.

Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. Prereq: PSYC 260 or PSYC 351. {Also offered for graduate credit - see PSYC 686.}.

PSYC 489. Honors Thesis. 1-6 Credits.

Capstone experience option.

PSYC 491. Seminar. 1-5 Credits.**PSYC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

PSYC 493. Undergraduate Research. 1-5 Credits.**PSYC 494. Individual Study. 1-5 Credits.****PSYC 496. Field Experience. 1-15 Credits.****PSYC 499. Special Topics. 1-5 Credits.****PSYC 640. Experimental Methods. 3 Credits.**

Intermediate experimental design and data analysis with emphasis on the analysis of variance. Laboratory includes data analysis on the computer. {Also offered for undergraduate credit - see PSYC 440.}.

PSYC 650. Computational Methods in Experimental Psychology. 3 Credits.

An introduction to fundamental research methods in visual and cognitive neuroscience. This is a computer-based course using MatLab and Psychtoolbox to prepare students for modern psychology laboratory research. {Also offered for undergraduate credit - see PSYC 450.}.

PSYC 653. Organizational Psychology. 3 Credits.

Survey of topics related to application of psychology to organizational settings. Emphasis on the theoretical bases of the individual (leadership, decision making) (motivation, satisfaction) and social (influence, workgroup) (leadership, work group) factors involved in work behavior. {Also offered for undergraduate credit - see PSYC 453.}.

PSYC 657. Managing Work Motivation and Morale. 3 Credits.

An exploration of how the theories of work motivation and morale can be applied to manage the behavior and performance of people at work. Cognitive, behavioral, attitudinal, organizational and individual psychological approaches are considered. {Also offered for undergraduate credit - see PSYC 457.}.

PSYC 660. Sensation & Perception. 3 Credits.

Explores physical, anatomical, and physiological bases of sensation and perception and their psychophysical measurement. Laboratory experiments complement lectures and demonstrate various experimental techniques and sensory phenomena. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 460.}.

PSYC 661. Memory and Knowledge. 3 Credits.

Examination of current behavioral and neuropsychological research and theory in the area of memory and knowledge representation. Various cognitive phenomena are demonstrated and relevant design issues are highlighted via laboratory experiments. {Also offered for graduate credit - see PSYC 461.}.

PSYC 663. Experimental Developmental Psychology. 3 Credits.

Examination of historical and contemporary theory and research in social and cognitive development. Topics include attachment, adolescent risk-taking, theories of intelligence, and meta-cognition. Laboratory experiences illustrate methods of investigating psychological development. {Also offered for undergraduate credit - see PSYC 463.}.

PSYC 664. Attention & Thinking. 3 Credits.

Examines current behavioral and neuropsychological research and theory in the area of attention and thought processes. Laboratory experiments will demonstrate various attentional phenomena and highlight relevant design issues. {Also offered for undergraduate credit - see PSYC 464.}.

PSYC 665. Psychobiology. 3 Credits.

Fundamental anatomy (structure) and physiology (function) of the nervous system. Physiological bases of behavior. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 465.}.

PSYC 668. Personality. 3 Credits.

Study of complex human behavior with attention to historically significant theories and current empirical issues. Laboratory experiences illustrate methods of investigating individual differences. {Also offered for undergraduate credit - see PSYC 468.}.

PSYC 670. Experimental Social Psychology. 3 Credits.

Examination of historical and contemporary theory and research in social psychology. Study of the relationship between the individual and social context. 2 lectures, equivalent of 2-hour laboratory. {Also offered for undergraduate credit - see PSYC 470.}.

PSYC 671. The Psychology Of Aging. 3 Credits.

Survey of cognitive and psychosocial development in adulthood and old age, including psychopathologies of old age. Contemporary research findings are emphasized. {Also offered for undergraduate credit - see PSYC 471.}.

PSYC 672. Advanced Psychopathology. 3 Credits.

In-depth coverage of recent research on diagnosis, etiology, and maintenance of behavior disorders emphasizing the interaction of biological, behavioral, and social factors. {Also offered for undergraduate credit - see PSYC 472.}.

PSYC 673. Child Psychopathology and Therapy. 3 Credits.

Overview of the etiology and treatment of behavior disorders in children and adolescents. Emphasis on recent research findings and behavioral intervention strategies. {Also offered for undergraduate credit - see PSYC 473.}.

PSYC 680. History & Systems. 3 Credits.

Historical development of scientific psychology. Emphasis on the development of various systems of psychology in America. Capstone experience. {Also offered for undergraduate credit - see PSYC 480.}.

PSYC 681. Health Psychology. 3 Credits.

Application of behavioral procedures to the prevention, treatment, and rehabilitation of medical disorders. Emphasis on contemporary research findings. {Also offered for undergraduate credit - see PSYC 481.}.

PSYC 686. Neuropsychology. 3 Credits.

Introduction to human neuropsychology with emphasis on the neural basis of motor, perceptual, cognitive, emotive, and language behavior. Topics include normal and pathological conditions from clinical and experimental perspectives. {Also offered for undergraduate credit - see PSYC 486.}.

PSYC 690. Graduate Seminar. 1-3 Credits.**PSYC 695. Field Experience. 1-15 Credits.****PSYC 696. Special Topics. 1-5 Credits.****PSYC 718. Visual Neuroscience. 3 Credits.**

A detailed survey of current ideas, methods, and perspectives in visual neuroscience.

PSYC 720. Advanced Topics in Cognitive Neuroscience. 3 Credits.

Examines prominent theories, research approaches, and experimental findings in the field of cognitive neuroscience. Included topics are methodological issues and cognitive neuroscience approaches to research questions in a broad range of areas within cognitive psychology.

PSYC 727. Advanced Topics in Visual Perception. 3 Credits.

Integrated overview of the field of vision research. Addresses recent developments in the study of the phenomenology, psychophysics, and neural substrates of human visual sensation and perception.

PSYC 731. Fundamental Processes in Cognition. 3 Credits.

Explores the underlying architecture of the human cognitive system; how it takes in, processes, stores, and retrieves information.

PSYC 732. Applied Cognitive Process. 3 Credits.

Explores the ways cognitive principles operate in ecologically valid (real-world) situations.

PSYC 733. Social Judgment. 3 Credits.

Explores issues and topics related to judgment and decision-making in social contexts as well as the influence of social factors on judgment processes.

PSYC 735. Neural Networks. 3 Credits.

See Computer Science for description.

PSYC 750. Introduction to Clinical Issues and Practices. 1 Credit.

Instruction and practice in clinical interview techniques and discussion of clinical issues including ethics, laws, and crisis intervention.

PSYC 755. Empirically Supported Interventions I. 4 Credits.

Introduction to assessment and intervention with a focus on principles of clinical psychological science, case conceptualization, and foundational therapeutic skills.

PSYC 756. Empirically Supported Interventions II. 4 Credits.

In depth review of contemporary psychological interventions and skill development for evidence based practice. Prereq: PSYC 755.

PSYC 758. Diversity in Clinical Psychology. 3 Credits.

This course emphasizes issues of cultural and individual diversity within the context of scientific research. In addition, the course will train students in culturally competent techniques for the assessment, diagnosis, and treatment of mental disorders in clinical practice.

PSYC 760. Research Methods in Visual and Cognitive Neuroscience. 3 Credits.

This course provides both theoretical and practical training in methodological skills essential for the conduct of high-quality research in the field of visual and cognitive neuroscience. May be repeated for credit with a change in topic.

PSYC 761. Applied Research Methods. 3 Credits.

Experimental methodology and design skills useful in clinical research including N=1 designs, experimental, and quasi-experimental designs. Laboratory includes reports on recent research articles, presentations on specific content areas, and development of a detailed research proposal.

PSYC 762. Advanced Research Methods and Analysis. 3 Credits.

Advanced experimental design and data analysis. Emphasis on regression models as applied to psychological data and designs. Includes analysis on the computer. Lecture, laboratory. Prereq: PSYC 640.

PSYC 763. Grant Writing for Psychological Scientists. 3 Credits.

This course familiarizes graduate students with methods for finding and securing grants in the psychological sciences. Readings, in-class discussions, and writing/reviewing workshops will help students prepare to make their own grant submissions.

PSYC 764. Advanced Topics in Attention. 3 Credits.

Examines prominent theories of attention and empirical evidence in support of those theories. Included topics focus on the role of attention in thought, perception, and action.

PSYC 770. Testing and Assessment. 3 Credits.

Introduction to scale construction and test theory. Administration, interpretation, and reporting of intelligence and objective personality testing.

PSYC 771. Social/Health Psychology Research. 3 Credits.

Covers research designs frequently utilized in conducting social psychology related research with particular emphasis on health psychology.

PSYC 782. Emotions. 3 Credits.

Focused on basic questions about defining emotions, differences in experiencing or expressing emotions, and relatedness to cognition. Includes emotions and psychotherapy, emotions in a social context, and the impact of emotional expressions versus repression on health.

PSYC 787. Advanced Social Psychology and Health. 3 Credits.

Covers theory and research from social psychology that has implications for health behavior. Emphasizes theories of attitudes and behavior applied to such topics as regimen adherence, self-protective health behavior, and disease prevention. Prereq: PSYC 670, 681.

PSYC 790. Graduate Seminar. 1-3 Credits.**PSYC 791. Temporary/Trial Topics. 1-5 Credits.****PSYC 793. Individual Study/Tutorial. 1-5 Credits.****PSYC 794. Practicum/Internship. 1-8 Credits.****PSYC 795. Field Experience. 1-15 Credits.****PSYC 796. Special Topics. 1-5 Credits.****PSYC 797. Master's Paper. 1-3 Credits.****PSYC 798. Master's Thesis. 1-10 Credits.****PSYC 892. Graduate Teaching Experience. 1-6 Credits.****PSYC 894. Practicum/Internship. 1-8 Credits.****PSYC 897. Cooperative Education. 1-4 Credits.****PSYC 899. Doctoral Dissertation. 1-15 Credits.**

Public Health (PH)

Courses

PH 101. Introduction to Public Health. 3 Credits.

This course introduces undergraduate students to the interdisciplinary and exciting field of public health. Discussing and studying the processes and practices of public health enhances the population health perspective of healthcare and other professionals.

PH 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PH 452. Lifestyle Approaches to Prevention, Treatment, and Reversal of Disease. 3 Credits.

Explore Lifestyle Medicine and apply the science of lifestyle behaviors in the prevention, treatment, and reversal of disease. Prereq: BIOL 221, 221L. {Also offered for graduate credit - See PH 652.}.

PH 474. Epidemiology. 3 Credits.

Study of the distribution and dynamics of disease in populations. {Also offered for graduate credit - see PH 674.}.

PH 479. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

PH 491. Seminar. 1-5 Credits.

PH 652. Lifestyle Approaches to Prevention, Treatment, and Reversal of Disease. 3 Credits.

Explore Lifestyle Medicine and apply the science of lifestyle behaviors in the prevention, treatment, and reversal of disease. Prereq: matriculated into the MPH program or public health certificate. {Also offered for undergraduate credit - See PH 452.}.

PH 674. Epidemiology. 3 Credits.

Study of the distribution and dynamics of disease in populations. {Also offered for undergraduate credit - see PH 474.}.

PH 700. Preventing and Managing Chronic Illness. 3 Credits.

This course will explore the effects of chronic health issues on individuals, families, and lay caregivers from a public health and clinical systems perspective. PH students only.

PH 704. Public Health Management and Policy. 3 Credits.

The course will provide a pragmatic overview of the issues, constituents, processes, and tools of public health management and policy.

PH 705. Global Health. 3 Credits.

This course will survey the health of populations globally and introduce strategies, programs and health systems designed to improve the health of those populations. Prereq: Admission to PH program.

PH 706. Essentials of Epidemiology. 3 Credits.

Emphasis on application of the principles of epidemiology as applied to the investigation and prevention of individual and population health problems.

PH 711. Integrating Primary Care and Public Health. 3 Credits.

The course examines the role of primary care and public health in addressing personal and population health issues with particular attention to social determinants of health, health inequities, cultural competence, and community involvement to address contemporary challenges to the health of U.S. populations.

PH 712. Public Health Research Methods. 3 Credits.

This course provides an introduction to a variety of research methods and key components of a research study that can be employed in public health research and practice.

PH 720. Environmental Health. 2 Credits.

Analysis of key concepts, principles, and applications of the primary natural and social science disciplines that underpin the core of environmental health.

PH 722. Applied Community Health. 3 Credits.

This course is designed to provide students with knowledge and skills needed to address public health issues within community settings. Prereq: Public Health students only.

PH 725. Promoting Health through Policy, System and Environment. 3 Credits.

This course will focus on health promotion at community, state, and national levels through policy, system, and environment (PSE) strategies through readings, films, writing, and discussion.

PH 731. Biostatistics. 3 Credits.

This core course introduces the selection, use and interpretation of basic statistical tests and concepts that may be used in addressing, analyzing and solving problems in public health, biomedical and health care research.

PH 735. Principles of Infectious Disease Management I. 3 Credits.

The course is the first part of a two-part series that will provide a foundational overview of the major infectious diseases that have a significant impact on public health.

PH 736. Principles of Infectious Disease Management II. 3 Credits.

The course will build on PH 735, Principles of Infectious Disease Management I and focus on the epidemiology, clinical presentation, treatment, and control of the major communicable diseases. Prereq: PH 735.

PH 741. Social and Behavioral Sciences in Public Health. 3 Credits.

Foundation knowledge and competencies in applying social and behavioral sciences theories and methods to public health problems.

PH 745. Community Health Leadership. 3 Credits.

This course will focus on developing leadership and collaboration skills required by public health leaders to work with community leaders and organizations.

PH 750. Epidemiologic Methods I. 2 Credits.

This course covers the development of an observational epidemiologic study and the use and interpretation of methods and techniques for analyzing observational epidemiologic data. Prereq: PH 706, PH 731.

PH 752. Epidemiologic Methods II. 2 Credits.

Distribution and dynamics of disease in populations and methods for detecting and interpreting spatial patterns of disease.

PH 753. Public Health Surveillance. 2 Credits.

This course provides an introduction to public health surveillance and key characteristics of a variety of surveillance systems that can be utilized in all fields of public health practice. Lectures from experts in the field will provide real world examples and opportunities for students to interact with public health professionals.

PH 754. Health Survey Research. 2 Credits.

This course will familiarize students with the use of survey research methods. The course will cover practical issues in survey methods, with a focus on instrument development, mode of data collection, sampling, and minimizing survey error. The course will include hands-on development of a survey instrument, a cover letter, and a sampling plan.

PH 765. Cultural Competence in Health Professions. 3 Credits.

The purpose of this course is to provide education and skill building that will enable students to effectively utilize cultural and linguistic competence as a key tool to improve health outcomes and understanding of communication for diverse populations. PH students only.

PH 772. American Indian Health Equity. 3 Credits.

To provide a detailed overview of the basis for and regional differences in American Indian health inequity and disparities as well as strategies to reduce these in culturally appropriate ways. Prereq: Admission to the PH program.

PH 774. Research and Evaluation in Tribal Communities. 3 Credits.

The course will provide a detailed overview of the unique considerations for conducting health-related research and evaluation in Indigenous communities. Considerations include centering Indigenous ways of knowing and methodologies, creating community-driven research agendas, sovereignty, distrust of research and evaluation based on historical and contemporary abuses, effective partnerships with non-Indigenous allies, and strengths and limitations of datasets for addressing health disparities. Prereq: Admission to PH program.

PH 775. Case Studies in Indian Health. 3 Credits.

This course will provide an overview of several case studies in American Indian and Alaska Native Health that have been successfully implemented. The cases will be examined to determine what worked, why it worked, and challenges in developing successful programs. Prereq: Admission to the PH program.

PH 789. Integrative Learning Experience. 1 Credit.

Students must complete an integrative learning experience (ILE) that demonstrates synthesis of foundational and concentration competencies selected based on student's educational and professional goals. Must have department permission to register.

PH 790. Graduate Seminar. 1-5 Credits.**PH 793. Individual Study. 1-5 Credits.****PH 794. Practicum. 1-8 Credits.****PH 795. Field Experience. 1-15 Credits.****PH 798. Master's Thesis. 1-10 Credits.****PH 899. Doctoral Dissertation. 1-15 Credits.**

Radiologic Sciences (RS)

RS 199. Special Topics. 1-5 Credits.**RS 200. Introduction to Radiologic Sciences. 1 Credit.**

Lectures, discussions, and field trips focus on professional traits, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

RS 496. Field Experience. 1-15 Credits.

Radiologic Sciences professional majors only.

RS 499. Special Topics. 1-5 Credits.

Range Science (RNG)

RNG 136. Introduction to Range Management. 3 Credits.

Principles of range management which include plant identification, range evaluation, and range improvement. 3 lectures. F.

RNG 194. Individual Study. 1-5 Credits.**RNG 196. Field Experience. 1-15 Credits.****RNG 213. Rangeland Sampling Techniques. 3 Credits.**

Introduction to rangeland aquatic, invertebrate, soil, and vegetation sampling techniques, and the proper procedures for basic data entry and interpretation. Prereq: RNG 136.

RNG 225. Natural Resource & Agro-Ecosystems. 3 Credits.

Introduction to scientific theories and their relation to natural resources and agriculture. Influence of these theories on current perspectives toward the environment. 3 lectures. Cross-listed with NRM 225.

RNG 294. Individual Study. 1-5 Credits.**RNG 296. Field Experience. 1-15 Credits.****RNG 394. Individual Study. 1-5 Credits.****RNG 397. Fe/Coop Ed/Internship. 1-15 Credits.****RNG 450. Range Plants. 3 Credits.**

Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. {Also offered for graduate credit - see RNG 650.}.

RNG 451. Ecology of Fire-Dependent Ecosystems. 3 Credits.

Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. Prereq: RNG 136 and BIOL 461. {Also available for graduate credit - see RNG 651.}.

RNG 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 652.}.

RNG 453. Rangeland Resources Watershed Management. 3 Credits.

Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Prereq: RNG 136 or NRM 225. Cross-listed with NRM 453. {Also offered for graduate credit - see RNG 653.}.

RNG 454. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and SOIL 454. F (even years) {Also offered for graduate credit - see RNG 654.}.

RNG 456. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Prereq: RNG 136. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 656.}.

RNG 458. Grazing Ecology. 3 Credits.

Grazing processes and systems and their effects on plants and herbivores. 3 lectures. Prereq: RNG 136. F (even years) {Also offered for graduate credit - see RNG 658.}.

RNG 462. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and SOIL. {Also offered for graduate credit - see RNG 662.}.

RNG 491. Seminar. 1-5 Credits.**RNG 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RNG 494. Individual Study. 1-5 Credits.**RNG 496. Field Experience. 1-15 Credits.****RNG 650. Range Plants. 3 Credits.**

Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. {Also offered for undergraduate credit - see RNG 450.}.

RNG 651. Ecology of Fire-Dependent Ecosystems. 3 Credits.

Overview of the evolution and ecology of wildland fire in fire-dependent ecosystems globally, with an emphasis on the ecology and management of fire in North America. {Also available for undergraduate credit - see RNG 451.}.

RNG 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM and SOIL. {Also offered for undergraduate credit - See RNG 452.}.

RNG 653. Rangeland Resources Watershed Management. 3 Credits.

Study of the management of physical/biological settings and processes along with human activities on water and watersheds considering preventative and restorative strategies in a rangeland setting. Cross-listed with NRM 653. {Also offered for undergraduate credit - see RNG 453.}.

RNG 654. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland assessment, and wetland improvement. {Also offered for undergraduate credit - see RNG 454.}.

RNG 656. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM and SOIL. {Also offered for undergraduate credit - see RNG 456.}.

RNG 658. Grazing Ecology. 3 Credits.

Grazing processes and systems and their effects on plants and herbivores. 3 lectures. F (even years) {Also offered for undergraduate credit - see RNG 458.}.

RNG 662. Natural Resources and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and SOIL. {Also offered for undergraduate credit - see RNG 462.}.

RNG 695. Field Experience. 1-15 Credits.**RNG 716. Agrostology. 3 Credits.**

Identification and description of U.S. grasses and grass-like plants. 2 lectures, 2 two-hour laboratories. F (even years).

RNG 717. Aquatic Vascular Plants. 3 Credits.

Identification of major aquatic vascular plants in the Northern Great Plains, utilization of major plant identification keys for the region, and descriptions of ecological roles of species for utilization in assessment, monitoring, and delineation. 1 lecture, 2 two-hour laboratories. F (odd years).

RNG 737. Agroecosystem Management and Conservation. 3 Credits.

Discussion and field course that emphasizes current conservation and management practices influencing agroecosystems. The overarching concepts will link soils, vegetation, invertebrates, vertebrates and society.

RNG 749. Applied Global Change Ecology. 3 Credits.

Discussion driven course that emphasizes current peer-review literature investigating the influence of human-driven global changes on natural resources. The class will include topics ranging from climate change to energy expansion and assisted colonization.

RNG 765. Analysis Of Ecosystems. 3 Credits.

Introduction to advanced statistical techniques to evaluate plant communities, plant-animal interactions, and plant-soil relationships. Emphasis on multivariate analysis. 2 lectures, 1 two-hour laboratory. S (even years).

RNG 790. Graduate Seminar. 1-5 Credits.**RNG 791. Temporary/Trial Topics. 1-5 Credits.****RNG 792. Graduate Teaching Experience. 1-6 Credits.****RNG 793. Individual Study/Tutorial. 1-5 Credits.****RNG 794. Practicum/Internship. 1-8 Credits.****RNG 795. Field Experience. 1-15 Credits.****RNG 796. Special Topics. 1-5 Credits.****RNG 797. Master's Paper. 1-3 Credits.****RNG 798. Master's Thesis. 1-10 Credits.****RNG 892. Graduate Teaching Experience. 1-6 Credits.****RNG 899. Doctoral Dissertation. 1-15 Credits.**

Religious Studies (RELS)

RELS 100. World Religions. 3 Credits.

Explores the beliefs, practices and origins of the world's major religions and introduces analytical approaches to studying religion.

RELS 194. Individual Study. 1-5 Credits.

RELS 196. Field Experience. 1-15 Credits.

RELS 199. Special Topics. 1-5 Credits.

RELS 220. Old Testament. 3 Credits.

Study of the religious, political, and social history of ancient Israel as reflected in the Hebrew Bible.

RELS 230. New Testament. 3 Credits.

Survey of the religious, political, and social history of the New Testament and other early Christian literature.

RELS 270. American Religious History. 3 Credits.

Introduction to the basic issues in American history including the study of Puritans, immigration, church and state, revivalism, civil and military religion, apocalypticism, and new age religion. Cross-listed with HIST 270.

RELS 291. Seminar. 1-5 Credits.

RELS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RELS 294. Individual Study. 1-5 Credits.

RELS 299. Special Topics. 1-5 Credits.

RELS 315. Contemporary Religion. 3 Credits.

Study of how contemporary cultural developments require the rethinking of historic religious perspectives in such topics as natural science, political thought, psychology, history, and gender.

RELS 320. History of Christianity. 3 Credits.

Major developments in the Christian religion including scriptures, persecution, monasticism, papacy, Reformation, science and religion, and the ecumenical movement. Cross-listed with HIST 320.

RELS 335. History of Judaism. 3 Credits.

Survey of major historical, religious, and cultural developments in Jewish traditions from the early Second Temple period to the present.

RELS 340. New Religious Movements. 3 Credits.

This course examines the creation and sustainability of new religious movements, including Scientology, Jehovah's Witness, Aum Shinrikyo, Peoples Temple and the Church of Latter Day Saints, and the history of anti-cult movements.

RELS 345. Religion and Politics. 3 Credits.

Religion and politics are intertwined throughout national and international politics. This class will explore the historical precedent for this entanglement as well as current issues concerning gender, sexuality, religious nationalism and religious liberty.

RELS 355. History of Global Islam. 3 Credits.

Examination of the foundational history, texts, laws and rituals of Islam, in addition to the lived experience of Islam and related political dynamics in the Middle East, Europe, Asia, Africa and North America. Cross-listed with HIST 355.

RELS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

RELS 391. Seminar. 1-5 Credits.

RELS 394. Individual Study. 1-5 Credits.

RELS 399. Special Topics. 1-5 Credits.

RELS 401. Sociology of Religion. 3 Credits.

See Sociology for description. {Also offered for graduate credit - see RELS 601.}.

RELS 410. Religion and Violence. 3 Credits.

An analysis and assessment of critical theories on religion and violence, including examinations of martyrdom and redemptive suffering, the violence of social stratification and "othering", war and terrorism, and apocalyptic and spiritual warfare.

RELS 453. Magic And Religion. 3 Credits.

Comparative religion, religious concepts, practices, and practitioners. In-depth study of selected religious systems with a focus on shamanic religions. Prereq: ANTH 111. Cross-listed with ANTH 453.

RELS 460. Theory and Methods of Religious Studies. 3 Credits.

Analysis, assessment, and application of classic and contemporary theories of religious studies. {Also offered for graduate credit - see RELS 660}.

RELS 491. Seminar. 1-5 Credits.

RELS 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RELS 493. Undergraduate Research. 1-5 Credits.

RELS 494. Individual Study. 1-5 Credits.

RELS 496. Field Experience. 1-15 Credits.

RELS 499. Special Topics. 1-5 Credits.

RELS 660. Theory and Methods of Religious Studies. 3 Credits.

Analysis, assessment, and application of classic and contemporary theories of religious studies. {Also offered for undergraduate credit - see RELS 460}.

Respiratory Care (RC)

RC 194. Individual Study. 1-5 Credits.

RC 196. Field Experience. 1-15 Credits.

RC 199. Special Topics. 1-5 Credits.

RC 200. Introduction to Respiratory Care. 1 Credit.

Introduction to the profession of respiratory care. Lectures, discussions, and field trips focus on professional traits and communication, ethical behavior of the health care provider, major curriculum requirements, and scope of practice.

RC 291. Seminar. 1-3 Credits.

RC 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 294. Individual Study. 1-5 Credits.

RC 299. Special Topics. 1-5 Credits.

RC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

RC 391. Seminar. 1-5 Credits.

RC 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 394. Individual Study. 1-5 Credits.

RC 399. Special Topics. 1-5 Credits.

RC 491. Seminar. 1-5 Credits.

RC 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

RC 494. Individual Study. 1-5 Credits.

Respiratory Care professional majors only.

RC 496. Field Experience. 1-15 Credits.

Respiratory Care professional majors only.

RC 499. Special Topics. 1-5 Credits.

Science, Technology, Engineering, and Mathematics (STEM)

STEM 303. The Science of Learning. 1 Credit.

This course is designed for students serving as Learning Assistants in the College of Science and Mathematics and who are interested in the science behind learning in the STEM disciplines.

STEM 494. Individual Study. 1-5 Credits.

STEM 790. Graduate Seminar. 1-5 Credits.

STEM 795. Field Experience. 1-15 Credits.

STEM 810. Teaching College Science. 3 Credits.

This course is designed for graduate students in the sciences who are interested in learning more about science teaching and student learning at the undergraduate level.

STEM 820. STEM Curriculum and Instruction. 3 Credits.

This course focuses on research on assessment and curricula designed to identify and address conceptual and reasoning difficulties of students in math and science. A variety of assessments and research-based curricula will be used and critically analyzed. Issues related to challenges of implementing reform-based curricula will also be discussed.

STEM 830. Research Methods in STEM Education. 3 Credits.

Course covers an array of research methods that are commonly used within discipline-based education research literature and discusses those methods within the framework of the primary literature of those disciplines.

STEM 840. Designing Technology-infused Learning Environments in Higher Education. 3 Credits.

This course will prepare current and future college-level instructors to effectively infuse appropriate technology tools into contemporary higher education learning environments.

STEM 890. Graduate Seminar. 1-5 Credits.

STEM 893. Individual Study/Tutorial. 1-5 Credits.

Sociology (SOC)

SOC 110. Introduction to Sociology. 3 Credits.

Introductory analysis of the nature of society, the interrelationship of its component groups, and the process whereby society persists and changes.

SOC 115. Social Problems. 3 Credits.

Sociological analysis of major social problems.

SOC 116. Global Social Problems. 3 Credits.

Sociological analysis of global social problems.

SOC 179. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 194. Individual Study. 1-5 Credits.

SOC 196. Field Experience. 1-15 Credits.

SOC 199. Special Topics. 1-5 Credits.

SOC 214. Social Interaction. 3 Credits.

Examination of issues relevant to the study of individual behavior (e.g., self-concept, attitudes, social perception) in a social context. Cross-listed with PSYC 214.

SOC 233. Sociology of Organizations and Work. 3 Credits.

This course examines major types of organizations, their goals, and characteristics. The course focuses on social issues as they relate to organizations and work.

SOC 235. Cultural Diversity. 3 Credits.

Analysis of lifestyles and characteristics of racial, cultural, and ethnic groups in society. Review of processes of discrimination, prejudice, and related dehumanizing biases toward culturally diverse groups including women.

SOC 279. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 291. Seminar. 1-5 Credits.**SOC 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 294. Individual Study. 1-5 Credits.**SOC 299. Special Topics. 1-5 Credits.****SOC 340. Social Research Methods. 3 Credits.**

Overview of the scientific method, the philosophy of science, and the goals of science. Detailed study of qualitative and quantitative methodologies. Cross-listed with COMM 340.

SOC 341. Social Research Methods Laboratory. 1 Credit.

Laboratory to accompany SOC 340. Provides application of conceptualization, operationalization, sampling methods, qualitative and quantitative research methods, and computer statistical analysis. Cross-listed with COMM 341.

SOC 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOC 391. Seminar. 1-3 Credits.**SOC 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 394. Individual Study. 1-5 Credits.**SOC 399. Special Topics. 1-5 Credits.****SOC 401. Sociology of Religion. 3 Credits.**

Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 401. {Also offered for graduate credit - see SOC 601.}.

SOC 403. Sociology of The Great Plains. 3 Credits.

Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for graduate credit - see soc 603.}.

SOC 404. Community Assessment. 3 Credits.

Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for graduate credit - see SOC 604.}.

SOC 405. Community Development. 3 Credits.

Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. Prereq: SOC 404. {Also offered for graduate credit - see SOC 605.}.

SOC 407. Deviant Behavior. 3 Credits.

See Criminal Justice for description. {Also offered for graduate credit - see SOC 607.}.

SOC 410. Social Inequality. 3 Credits.

Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for graduate credit - see SOC 610.}.

SOC 412. Sociology of Gender. 3 Credits.

This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. {Also offered for graduate credit - see SOC 612.}.

SOC 416. Sociology Through Literature. 3 Credits.

Study of basic concepts of sociology as illustrated in selected literature from 19th and 20th century English, American, French, and Russian novels. Prereq: SOC 110.

SOC 417. Sociology of the Family. 3 Credits.

Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for graduate credit - see SOC 617.}.

SOC 418. Social Psychology. 3 Credits.

Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. Prereq: SOC 110. {Also offered for graduate credit - see SOC 618.}.

SOC 422. Development Of Social Theory. 3 Credits.

Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. Prereq: SOC 110. {Also offered for graduate credit - see SOC 622.}.

SOC 424. Feminist Theory and Discourse. 3 Credits.

Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives. {Also offered for graduate credit - see SOC 624.}.

SOC 425. Sociology of Culture. 3 Credits.

This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. Prereq: SOC 110 or ANTH 111. {Also offered for graduate credit - see SOC 625.}.

SOC 426. Sociology of Medicine. 3 Credits.

Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for graduate credit - see SOC 626.}.

SOC 431. Environmental Sociology. 3 Credits.

Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions. {Also offered for graduate credit - see SOC 631.}.

SOC 439. Social Change. 3 Credits.

Analysis of the complex nature of social change in communities, the nation, and internationally. Prereq: SOC 110. {Also offered for graduate credit - see SOC 639.}.

SOC 440. Sociology of Aging. 3 Credits.

Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death. {Also offered for graduate credit - see SOC 640.}.

SOC 441. Death and Dying. 3 Credits.

Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 441. {Also offered for graduate credit - see SOC 641.}.

SOC 465. Applied Demographics. 3 Credits.

Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for graduate credit - see SOC 665.}.

SOC 470. Social Data Analysis. 3 Credits.

Experience with analysis of textual data and social survey data. Investigate patterns in social variables. Testing hypotheses and discovering relationships between variables. {Also offered for graduate credit - See SOC 670.}.

SOC 489. Senior Capstone In Sociology. 1 Credit.

Synthesis of social research methods, sociological theory, and sub-discipline content material. Emphasis on integrative skills needed to interrelate the basic concepts of the discipline. Prereq: SOC 340 or Senior standing.

SOC 491. Seminar. 1-5 Credits.**SOC 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 494. Individual Study. 1-5 Credits.**SOC 496. Field Experience. 1-15 Credits.****SOC 499. Special Topics. 1-5 Credits.****SOC 601. Sociology of Religion. 3 Credits.**

Study of religion viewed as a social institution with a characteristic history, ecology, structure, behavior, and purpose. Cross-listed with RELS 601. {Also offered for undergraduate credit - see SOC 401.}.

SOC 603. Sociology of The Great Plains. 3 Credits.

Social and cultural patterns, trends, and problems peculiar to life in the semi-arid Great Plains. {Also offered for undergraduate credit - see SOC 403.}.

SOC 604. Community Assessment. 3 Credits.

Students work with community leaders and their towns to conduct an asset-based community assessment of the town's human, social, cultural, political, built, financial, and natural capitals. {Also offered for undergraduate credit - see SOC 404.}.

SOC 605. Community Development. 3 Credits.

Study of communities viewed as social systems. Includes political, economic, social, and economic factors affecting community growth and decline. Community development methods are addressed. Prereq: SOC 604. {Also offered for undergraduate credit - see SOC 405.}.

SOC 607. Deviant Behavior. 3 Credits.

See Criminal Justice for description. {Also offered for undergraduate credit - see SOC 407.}.

SOC 610. Social Inequality. 3 Credits.

Analysis of social and economic inequities and investigation of the relationship between inequity and life chances. {Also offered for undergraduate credit - see SOC 410.}.

SOC 612. Sociology of Gender. 3 Credits.

This course examines the institutional norms, values, and attitudes that shape gender identity, as well as their affects on women and men's lives. {Also offered for undergraduate credit - see SOC 412.}.

SOC 617. Sociology Of The Family. 3 Credits.

Comparative family types, member relationships, family dynamics in relation to personality, social change, and social values. {Also offered for undergraduate credit - see SOC 417.}.

SOC 618. Social Psychology. 3 Credits.

Examination of both historical and contemporary research and theory in social psychology: the study of the relationship between the individual and the social context. {Also offered for undergraduate credit - see SOC 418.}.

SOC 622. Development Of Social Theory. 3 Credits.

Sociological theories and systems from Comte, Marx, Durkheim, and Weber through the 20th century. {Also offered for undergraduate credit - see SOC 422.}.

SOC 624. Feminist Theory and Discourse. 3 Credits.

Historical overview of feminist ideas and major writings from the 18th century to the present, which includes issues related to women's personal, social, and public lives. {Also offered for undergraduate credit - see SOC 424.}.

SOC 625. Sociology of Culture. 3 Credits.

This course introduces students to the foundations of the sociology of culture. Building on the ideas of the Frankfurt School and Birmingham Centre, this course explores topics such as subcultures and media culture. {Also offered for undergraduate credit - see SOC 425.}.

SOC 626. Sociology of Medicine. 3 Credits.

Analysis of the social aspects of health and illness, the health care professions, organization of health care, and related issues. {Also offered for undergraduate credit - see SOC 426.}.

SOC 631. Environmental Sociology. 3 Credits.

Examines the interactions between the biophysical environment and human society, how social processes define, construct, and threaten the environment, and the human causes and consequences of environmental problems and their solutions. {Also offered for undergraduate credit - see SOC 431.}.

SOC 639. Social Change. 3 Credits.

Analysis of the complex nature of social change in communities, the nation, and internationally. {Also offered for undergraduate credit - see SOC 439.}.

SOC 640. Sociology Of Aging. 3 Credits.

Examination of sociological perspectives on aging. Topics include social theories of aging, retirement, long-term care, chronic illness, and death. {Also offered for undergraduate credit - see SOC 440.}.

SOC 641. Death and Dying. 3 Credits.

Examination of research, theories, and case studies on the sociocultural dimensions of death and dying across time and societies. Topics include suicide, funerals, hospice practice, disasters, afterlife beliefs, grief, bereavement and memory, organ donation, death in popular culture, end-of-life issues, cemeteries and body disposition, euthanasia, art, film, music and literature, genocide, and war. Cross-listed with ANTH 641. {Also offered for undergraduate credit - see SOC 441.}.

SOC 665. Applied Demographics. 3 Credits.

Overview of demographic concepts and principles and their application to business and planning decisions. Emphasis on using databases and information sources available on the Internet. {Also offered for undergraduate credit - see SOC 465.}.

SOC 670. Social Data Analysis. 3 Credits.

Experience with analysis of textual data and social survey data. Investigate patterns in social variables. Testing hypotheses and discovering relationships between variables. {Also offered for undergraduate credit - See SOC 470.}.

SOC 690. Graduate Seminar. 1-3 Credits.**SOC 692. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOC 695. Field Experience. 1-15 Credits.**SOC 696. Special Topics. 1-5 Credits.****SOC 700. Qualitative Methods. 3 Credits.**

Advanced analysis of the methods used in qualitative research projects such as intensive interviewing, focus groups, and participant observation.

SOC 701. Quantitative Methods. 3 Credits.

Advanced analysis of the methods used in quantitative research projects, such as survey design, experimental design, and evaluation research. Prereq: STAT 725.

SOC 723. Social Theory. 3 Credits.

Examination of contemporary social theories and theory construction. Prereq: SOC 622.

SOC 733. Organizations and the State. 3 Credits.

This course tackles the complex set of historical, economic, political and sociological issues that affect embedded organizations. Students will learn applications of game and exchange theory models that will provide mechanistic explanations of power dynamics within and between organizations.

SOC 790. Graduate Seminar. 1-3 Credits.**SOC 791. Temporary/Trial Topics. 1-5 Credits.****SOC 793. Individual Study/Tutorial. 1-5 Credits.****SOC 794. Practicum/Internship. 1-8 Credits.****SOC 795. Field Experience. 1-15 Credits.****SOC 796. Special Topics. 1-5 Credits.****SOC 797. Master's Paper. 1-3 Credits.****SOC 798. Master's Thesis. 1-10 Credits.**

Soil Science (SOIL)

SOIL 194. Individual Study. 1-5 Credits.**SOIL 196. Field Experience. 1-15 Credits.****SOIL 199. Special Topics. 1-5 Credits.****SOIL 210. Introduction to Soil Science. 3 Credits.**

This is a 3-credit introductory-level course that will cover the basic principles of soil science. Topics will include the concepts of soil as a natural body, composition of soil, functions of soil, soil formation and classification, physical/chemical/biological properties of soils, and soil management and conservation. Lecture periods will consist of a combination of material presentation and designated time for applied learning activities.

SOIL 217. Introduction to Meteorology & Climatology. 3 Credits.

Basic meteorology-climatology concepts and their application; includes energy balance, greenhouse effect, temperature, pressure systems, lows, highs, fronts, winds, clouds, storms, humidity, precipitation, and measurements. Lectures, discussions, demonstrations. S.

SOIL 264. Natural Resource Management Systems. 3 Credits.

General principles of natural resource management, including soil and water conservation, soil and wind erosion, use of tillage and vegetation for conservation, drainage, irrigation, and soil and water quality. 3 lectures. Prereq: MATH 103, MATH 104 or MATH 107. Cross-listed with ASM 264 and NRM 264.

SOIL 291. Seminar. 1-5 Credits.**SOIL 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 294. Individual Study. 1-5 Credits.**SOIL 299. Special Topics. 1-5 Credits.****SOIL 322. Soil Fertility and Fertilizers. 3 Credits.**

Principles of plant nutrition and soil nutrient availability; soil testing and fertilizer recommendations and management. Macronutrient emphasis. 2 lectures, 1 two-hour laboratory. Prereq: SOIL 210, CHEM 121, CHEM 121L. S.

SOIL 351. Soil Ecology. 3 Credits.

Principles of soil-plant-animal interactions and their influences on environmental and agricultural issues of global significance (e.g. sustainable agriculture, global climate change, diversity conservation. Prereq: SOIL 210.

SOIL 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SOIL 391. Seminar. 1-5 Credits.**SOIL 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 394. Individual Study. 1-5 Credits.**SOIL 397. Fe/Coop Ed/Internship. 1-4 Credits.****SOIL 399. Special Topics. 1-5 Credits.****SOIL 410. Soils and Land Use. 3 Credits.**

Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. Prereq: SOIL 210, CHEM 121, CHEM 121L. {Also offered for graduate credit - see SOIL 610.}.

SOIL 433. Soil Ecohydrology and Physics. 3 Credits.

Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. Prereq: SOIL 210, PHYS 211. {Also offered for graduate credit - see SOIL 633.}.

SOIL 444. Soil Genesis and Survey. 3 Credits.

Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. Prereq: SOIL 210. F {Also offered for graduate credit - see SOIL 644.}.

SOIL 447. Microclimatology. 3 Credits.

Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. Prereq: PHYS 211. F (odd years) {Also offered for graduate credit - see SOIL 647.}.

SOIL 452. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM and RNG. {Also offered for graduate credit - See SOIL 652.}.

SOIL 454. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Prereq: SOIL 210. Cross-listed with NRM 454 and RNG 454. F (even years) {Also offered for graduate credit - see SOIL 654.}.

SOIL 456. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Prereq: RNG 136. Cross-listed with NRM and RNG. {Also offered for graduate credit - See SOIL 656.}.

SOIL 462. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Prereq: at least senior standing and must be a Natural Resources Management, Range Science or Soil Science major. Cross-listed with NRM and RNG. {Also offered for graduate credit - see SOIL 662.}.

SOIL 465. Soil And Plant Analysis. 3 Credits.

Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. Prereq: SOIL 210, CHEM 121, CHEM 122. S (odd years) {Also offered for graduate credit - see SOIL 665.}.

SOIL 491. Seminar. 1-5 Credits.**SOIL 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SOIL 494. Individual Study. 1-5 Credits.**SOIL 496. Field Experience. 1-15 Credits.****SOIL 499. Special Topics. 1-5 Credits.****SOIL 610. Soils and Land Use. 3 Credits.**

Principles of chemistry, physics and biology will be used to determine the effects of soil management, agrichemical usage, livestock production, and vegetation on the environment using scales ranging from microsite to watershed. {Also offered for undergraduate credit - see SOIL 410.}.

SOIL 633. Soil Ecohydrology and Physics. 3 Credits.

Introduction of the fate and transport of water, heat, and solutes in soils of natural ecosystems and agricultural landscapes with focus on the physical characteristics of soil, fluxes across interfaces, and prediction of flows within and across the vadose zone and the critical zone. Application of concepts and predictions to real-world scenarios and case studies. {Also offered for undergraduate credit - see SOIL 433.}.

SOIL 644. Soil Genesis and Survey. 3 Credits.

Introduction to soil genesis, morphology, geography and soil survey, 2 lectures, 1 four-hour laboratory (first 10 weeks only) focuses on soil description and properties in situ. F {Also offered for undergraduate credit - see SOIL 444.}.

SOIL 647. Microclimatology. 3 Credits.

Characteristics and causes of the climate near the ground and its interaction with living organisms. Energy and mass transfer concepts. Lectures, discussions, demonstrations, field trips. F (odd years) {Also offered for undergraduate credit - see SOIL 447.}.

SOIL 652. Managing Natural and Rangeland Resources using GIS. 3 Credits.

The application of Geographic Information Systems to managing natural and rangeland resources will be investigated. Different natural and rangeland resource datasets, analysis methods, and software packages will be utilized. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - See SOIL 452.}.

SOIL 654. Wetland Resources Management. 3 Credits.

Principles of wetland systems, wetland management, wetland functions, wetland delineation, wetland assessment, and wetland improvement. Cross-listed with NRM 654 and RNG 654. F (even years) {Also offered for undergraduate credit - see SOIL 454.}.

SOIL 656. Ecological Restoration. 3 Credits.

This course reviews ecological concepts inherent to ecosystem structure and function, including plant, soil, and animal ecology, and ecosystem response to disturbance. Furthermore, the course will illustrate how this ecological knowledge is used along with socioeconomic information to develop and implement effective restoration projects in both terrestrial and aquatic ecosystems. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - See SOIL 456.}.

SOIL 662. Natural Resource and Rangeland Planning. 3 Credits.

Capstone experience for School of Natural Resources Sciences majors: students use advanced planning tools and different management strategies to demonstrate integrated knowledge in managing public and private natural resources. Cross-listed with NRM and RNG. {Also offered for undergraduate credit - see SOIL 462.}.

SOIL 665. Soil And Plant Analysis. 3 Credits.

Laboratory analysis of soil, plant, and environmental materials for constituent elements. 2 lectures, 1 laboratory. S (odd years.) {Also offered for undergraduate credit - see SOIL 465.}.

SOIL 690. Graduate Seminar. 1-3 Credits.**SOIL 695. Field Experience. 1-15 Credits.****SOIL 696. Special Topics. 1-5 Credits.****SOIL 721. Environmental Field Instrumentation and Sampling. 2 Credits.**

To provide an overview of the tools (manual and electronic) concepts, and theories used to sample for physical, chemical, and biological parameters. F (odd years) (Two one-hour lectures and one four-hour laboratory per week.).

SOIL 733. Advanced Soil Nutrient Cycling. 3 Credits.

Overview of origins, nature, fate, and measurements of organic matter in soils, with specific focus on microbially-mediated, physical, and chemical processing of carbon, nitrogen, phosphorus, and other plant nutrients. Three lectures per week. Offered spring semester, even years.

SOIL 755. Soil Chemistry. 3 Credits.

Chemical reactions and equilibria, solubility relationships, mineral weathering, cation and anion adsorption, redox reactions, metal chelation, and fixation of nutrients in the soil. 3 lectures. F.

SOIL 763. Advanced Soil Hydrology and Physics. 3 Credits.

Theory of the fate and transport of water, heat, and solutes in soils with focus on analytical and numerical modeling across scales of individual pores, soil horizons, the vadose zone, and the critical zone. Prereq: SOIL 633.

SOIL 782. Precision Agriculture Principles for Nutrient Management. 3 Credits.

Advanced study of soil-plant-nutrient relationships with emphasis on precision agricultural concepts. 3 lectures.

SOIL 790. Graduate Seminar. 1-3 Credits.

SOIL 791. Temporary/Trial Topics. 1-5 Credits.

SOIL 792. Graduate Teaching Experience. 1-6 Credits.

SOIL 793. Individual Study/Tutorial. 1-5 Credits.

SOIL 794. Practicum/Teaching. 1-8 Credits.

SOIL 795. Field Experience. 1-15 Credits.

SOIL 796. Special Topics. 1-5 Credits.

SOIL 797. Master's Paper. 1-3 Credits.

SOIL 798. Master's Thesis. 1-10 Credits.

SOIL 892. Graduate Teaching Experience. 1-6 Credits.

SOIL 893. Individual Study. 1-5 Credits.

SOIL 899. Doctoral Dissertation. 1-15 Credits.

Spanish (SPAN)

SPAN 101. First-Year Spanish I. 4 Credits.

Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. No previous knowledge of Spanish required.

SPAN 102. First-Year Spanish II. 4 Credits.

Basic structures and vocabulary of Spanish. Practice in the fundamentals of listening, speaking, reading, and writing. Prereq: SPAN 101.

SPAN 194. Individual Study. 1-3 Credits.

SPAN 196. Field Experience. 1-15 Credits.

SPAN 199. Special Topics. 1-5 Credits.

SPAN 201. Second-Year Spanish I. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 102.

SPAN 202. Second-Year Spanish II. 3 Credits.

Emphasis on developing proficiency in the four language skills. Review of grammar, practice in composition, and cultural and literary readings. Prereq: SPAN 201.

SPAN 279. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SPAN 291. Seminar. 1-5 Credits.

SPAN 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 294. Individual Study. 1-5 Credits.

SPAN 299. Special Topics. 1-5 Credits.

SPAN 301. Spanish for Business. 3 Credits.

Advanced Spanish practice to develop greater proficiency in oral, reading, listening, and written skills in Spanish through the study of the Spanish-speaking business world and beyond. Prereq: SPAN 202 or equivalent.

SPAN 303. Spanish for Health Care. 2 Credits.

Practice to develop proficiency in Spanish speaking, listening, reading, and writing skills and cultural knowledge for the Spanish-speaking health care environment.

SPAN 311. Spanish Conversation and Composition I. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 312. Spanish Conversation and Composition II. 3 Credits.

Advanced practice to develop greater proficiency in oral and written skills through the study of cultural and literary readings. Prereq: SPAN 202.

SPAN 330. Introduction to Spanish Civilization. 3 Credits.

Introduction to the social, political and cultural history of Spain. Taught in Spanish. Prereq: SPAN 312.

SPAN 331. Introduction to Spanish American Civilization. 3 Credits.

Introduction to the social, political and cultural history of the Spanish-speaking Americas. Taught in Spanish. Prereq: SPAN 312.

SPAN 332. Introduction to Hispanic Cinema. 3 Credits.

Study of film genres, styles, or movements, focusing on aesthetic conventions, cultural context, socio-historical significance and critical approaches. Prereq: SPAN 312.

SPAN 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

SPAN 391. Seminar. 1-5 Credits.**SPAN 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 393. Undergraduate Research. 1-5 Credits.**SPAN 394. Individual Study. 1-5 Credits.****SPAN 399. Special Topics. 1-5 Credits.****SPAN 401. Advanced Spanish Grammar and Writing. 3 Credits.**

Writing practice with primary focus on form, syntax, and style. Taught in Spanish. Prereq: SPAN 312.

SPAN 402. Advanced Spanish Conversation. 3 Credits.

Advanced practice to develop greater oral proficiency through the analysis and discussion of cultural and literary texts. Prereq: SPAN 312.

SPAN 403. Advanced Spanish for Health Care. 1 Credit.

Advanced practice to develop greater proficiency in Spanish speaking, reading, listening, and writing skills and cultural knowledge for the Spanish-speaking health care environment. If you have not taken the required prerequisite/corequisite but feel you are qualified to take this course because of previous language study or experience, please see the course instructor or department chair to enroll. Prereq or Co-req: SPAN 311.

SPAN 430. Approaches to Literature. 3 Credits.

Emphasis on critical analysis of Spanish-language literary texts from a variety of theoretical perspectives so that students will develop the technical vocabulary necessary to discuss literary texts in Spanish and grasp levels of meaning in the literature. Taught in Spanish. Prereq: SPAN 312.

SPAN 440. Traditions in Spanish American Literature. 3 Credits.

Representative works from the pre-conquest era to the 21st century. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 411.

SPAN 441. Contemporary Spanish American Literature. 3 Credits.

Developments and techniques in contemporary texts through representative works. Overview of cultural, historical, and socio-political aspects, as well as literary background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 412.

SPAN 442. Introduction to Chicano Literature. 3 Credits.

Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. Prereq: SPAN 312 plus 6 additional upper-division credits. {Also offered for graduate credit - see SPAN 642.}

SPAN 443. Spanish American Women Writers. 3 Credits.

Developments and techniques in major texts by Spanish American women writers through representative works. Overview of cultural, historical and socio-political aspects, as well as literary background and criticism. Taught in Spanish. Prereq: SPAN 312.

SPAN 450. Traditions in Spanish Literature. 3 Credits.

Representative works of the literature of Spain from its epic beginnings to the contemporary period. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312. Formerly SPAN 410.

SPAN 451. Contemporary Spanish Literature. 3 Credits.

Representative works of the literature of Spain from modernity forward. Overview of literary movements, genres, and cultural background. Taught in Spanish. Prereq: SPAN 312.

SPAN 452. Cervantes. 3 Credits.

Study of representative works by Miguel de Cervantes, including Don Quixote. Taught in Spanish. Prereq: SPAN 312.

SPAN 453. Spanish Women Writers. 3 Credits.

Survey of representative works by women in the Spanish literary tradition. Prereq: SPAN 312.

SPAN 489. Senior Thesis. 1 Credit.

Integrative capstone experience for seniors majoring in Spanish; faculty guided research within the context of a 400-level literature or culture course leading to a substantive written project in Spanish and oral presentation to faculty and departmental majors. Prereq: Senior standing, study abroad.

SPAN 491. Seminar. 1-5 Credits.

SPAN 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

SPAN 494. Individual Study. 1-5 Credits.

SPAN 496. Field Experience. 1-15 Credits.

SPAN 499. Special Topics. 1-5 Credits.

SPAN 642. Introduction to Chicano Literature. 3 Credits.

Study of Chicano Literature, from the 19th century "californios" through the Chicano Renaissance to recent work by Chicana writers. Taught in Spanish. {Also offered for undergraduate credit - see SPAN 442.}.

SPAN 690. Graduate Seminar. 1-5 Credits.

Statistics (STAT)

STAT 194. Individual Study. 1-5 Credits.

STAT 196. Field Experience. 1-15 Credits.

STAT 199. Special Topics. 1-5 Credits.

STAT 291. Seminar. 1-5 Credits.

STAT 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 294. Individual Study. 1-5 Credits.

STAT 299. Special Topics. 1-5 Credits.

STAT 330. Introductory Statistics. 3 Credits.

Frequency tables, histograms, probability, well-known probability distributions, one and two sample tests of hypotheses, confidence intervals, and contingency tables. Prereq: MATH 103, MATH 104 or MATH 107 or Math placement into MATH 105, MATH 146 or MATH 165.

STAT 331. Regression Analysis. 2 Credits.

Simple and multiple regression techniques and correlation coefficients. Extensive use of SAS. Emphasis on applications. Prereq: STAT 330.

STAT 367. Probability. 3 Credits.

Probability, probability distributions for discrete random variables, probability density functions, marginal joint probability density functions, expected value and variance, and transformations. Prereq: MATH 166.

STAT 368. Statistics. 3 Credits.

Moments, moment generating functions, central limit theorem, one and two sample tests of hypotheses, estimation, and simple linear regression and correlation. Prereq: STAT 367.

STAT 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

STAT 391. Seminar. 1-5 Credits.

STAT 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 394. Individual Study. 1-5 Credits.

STAT 399. Special Topics. 1-5 Credits.

STAT 450. Stochastic Processes. 3 Credits.

Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. Prereq: STAT 368. {Also offered for graduate credit - see STAT 650.}.

STAT 460. Applied Survey Sampling. 3 Credits.

Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. Prereq: STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 660.}.

STAT 461. Applied Regression Models. 3 Credits.

Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. Prereq: MATH 128 or MATH 129, MATH 165, STAT 330 or STAT 368. {Also offered for graduate credit - see STAT 661.}.

STAT 462. Introduction to Experimental Design. 3 Credits.

Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. The class is designated as an undergraduate capstone course. Prereq: STAT 331 or STAT 461 and senior standing. {Also offered for graduate credit - see STAT 662.}.

STAT 463. Nonparametric Statistics. 3 Credits.

Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. Prereq: STAT 330 or STAT 368 {Also offered for graduate credit - see STAT 663.}.

STAT 464. Discrete Data Analysis. 3 Credits.

Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. Prereq: STAT 367. {Also offered for graduate credit - see STAT 664.}.

STAT 465. Meta-Analysis Methods. 3 Credits.

Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 331, STAT 461, or STAT 725. {Also offered for graduate credit - see STAT 665.}.

STAT 467. Probability and Mathematical Statistics I. 3 Credits.

Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Prereq: MATH 265 or STAT 368.

STAT 468. Probability and Mathematical Statistics II. 3 Credits.

Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Prereq: STAT 467.

STAT 469. Introduction to Biostatistics. 3 Credits.

Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. Prereq: STAT 330. {Also offered for graduate credit - see STAT 669.}.

STAT 470. Statistical SAS Programming. 3 Credits.

Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 461 or STAT 462. {Also offered for graduate credit - see STAT 670.}.

STAT 471. Introduction to the R Language. 3 Credits.

R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. Knowledge of matrix algebra and inferential statistics is expected. Prereq: STAT 330 or STAT 368; MATH 128 or MATH 129. {Also offered for graduate credit - see STAT 671.}.

STAT 472. Time Series. 3 Credits.

Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 468, STAT 461, course in matrix algebra. {Also offered for graduate credit - see STAT 672.}.

STAT 473. Actuarial Statistical Risk Analysis. 3 Credits.

Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 673.}.

STAT 476. Actuary Exam Study. 1 Credit.

Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468. Cross-listed with MATH.

STAT 477. Introductory Survival and Risk Analysis I. 3 Credits.

Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. Prereq: STAT 367 or STAT 467. {Also offered for graduate credit - see STAT 677.}.

STAT 478. Introductory Survival & Risk Analysis II. 3 Credits.

Distribution of the random variable- the time until future of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, intended to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 477 or STAT 677. {Also offered for graduate credit - see STAT 678.}.

STAT 491. Seminar. 1-5 Credits.**STAT 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

STAT 494. Individual Study. 1-5 Credits.**STAT 496. Field Experience. 1-15 Credits.****STAT 499. Special Topics. 1-5 Credits.****STAT 650. Stochastic Processes. 3 Credits.**

Discrete time Markov chains, Poisson processes, continuous time Markov chains, birth and death processes, renewal processes, branching processes, queuing systems, and applications. {Also offered for undergraduate credit - see STAT 450.}.

STAT 660. Applied Survey Sampling. 3 Credits.

Simple random, stratified, systematic and cluster sampling; two-stage sampling. Estimation of population means and variances. Ratio and regression estimators. {Also offered for undergraduate credit - see STAT 460.}.

STAT 661. Applied Regression Models. 3 Credits.

Simple linear regression, matrix approach to multiple regression, and introduction to various tests and confidence intervals. Includes discussion of multicollinearity and transformations. Knowledge of matrix algebra and knowledge of differential calculus is expected. {Also offered for undergraduate credit - see STAT 461.}.

STAT 662. Introduction to Experimental Design. 3 Credits.

Fundamental principles of designing an experiment, randomized block, Latin square, and factorial. Also covers analysis of covariance and response surface methodology. Knowledge of inferential statistics and regression analysis is expected. {Also offered for undergraduate credit - see STAT 462.}.

STAT 663. Nonparametric Statistics. 3 Credits.

Various tests and confidence intervals that may be used when the underlying probability distributions are unknown. Includes the Wilcoxon, Kruskal-Wallis, and Friedman. {Also offered for undergraduate credit - see STAT 483.}.

STAT 664. Discrete Data Analysis. 3 Credits.

Application of binomial, hypergeometric, Poisson, mixed Poisson, and multinomial distributions in discrete data analysis. Log-linear models and contingency tables. Logistic regression. Discrete discriminant analysis. {Also offered for undergraduate credit - see STAT 464.}.

STAT 665. Meta-Analysis Methods. 3 Credits.

Statistical methods for meta-analysis with applications. Various parametric effect size from a series of experiments: fixed effect, random effect linear models; combining estimates of correlation coefficients; meta-analysis in the physical and biological sciences. Prereq: STAT 661 or STAT 725. {Also offered for undergraduate credit - see STAT 465.}.

STAT 669. Introduction to Biostatistics. 3 Credits.

Introduction to biostatistical concepts and reasoning. Inference on means and proportion; Hypothesis testing; Group comparisons; Nonparametric methods; Sample size estimation; Contingency table; Simple and multiple regression; Logistic regression. {Also offered for undergraduate credit - see STAT 469.}.

STAT 670. Statistical SAS Programming. 3 Credits.

Focuses on statistical problem solving and writing SAS computer code. Data types, data management, data input/output, SAS as a programming language, data analysis, report writing, and graphing. Prereq: STAT 661 or STAT 662. {Also offered for undergraduate credit - see STAT 470.}.

STAT 671. Introduction to the R Language. 3 Credits.

R commands, expressions, functions, and matrix operations. Elements of programming and graphics in R. Statistical problem solving with R: linear regression, experimental design. Knowledge of matrix algebra and inferential statistics is expected. {Also offered for undergraduate credit - see STAT 471.}.

STAT 672. Time Series. 3 Credits.

Estimation of trend in time series data; seasonal models; stationary models; moving average, autoregressive, and ARMA models; model identification; forecasting; and intervention analysis. Prereq: STAT 768, STAT 661, course in matrix algebra. {Also offered for undergraduate credit - see STAT 472.}.

STAT 673. Actuarial Statistical Risk Analysis. 3 Credits.

Individual and collective actuarial risk models for claim random variables with applications in risk and survival analysis. Basics of interest theory and utility theory are also covered. The course is intended to prepare students for taking SOA/CAS Exam-2. {Also offered for undergraduate credit - See STAT 473.}.

STAT 677. Introductory Survival and Risk Analysis I. 3 Credits.

Survival distributions, life tables, and various risk models, intended to prepare students for taking higher level actuarial exams: SOA1 Course FM/CAS2 Exam 2 and SOA Course MLC/CAS Exam 3L. {Also offered for undergraduate credit - see STAT 477.}.

STAT 678. Introductory Survival and Risk Analysis II. 3 Credits.

Distribution of the random variable- the time until failure of a joint-life status, life tables, competing risks and multiple decrement probabilities, Markov chain and Poisson models, intended to prepare students for taking the actuarial exams: SOA1 Course MLC/CAS2 Exam 3L. Prereq: STAT 677. {Also offered for undergraduate credit - see STAT 478.}.

STAT 690. Graduate Seminar. 1-3 Credits.**STAT 696. Special Topics. 1-5 Credits.****STAT 711. Basic Computational Statistics using R. 3 Credits.**

Basic Statistics, General R, Data Manipulation, Basic Statistical Programming Skills, Simple Linear Regression, Classical Testing, and Categorical Data Analysis. Restriction: This course is designed for the certificate degree in Big Data Applied Statistics Analysis and it may not be used toward any other statistics degree.

STAT 712. Applied Statistical Machine Learning. 3 Credits.

This course provides several fundamental concepts and methods in statistical machine learning: linear method for regression, linear method for classification, KNN, regression tree, classification tree, bagging, random forest, boosting, support vector machine, neural networks, K-means clustering. Knowledge of basic inferential statistical methods is expected. Restriction: This course is one of the courses for the Certificate of Applied Big Data Analysis and it may not be used for the M.S. or Ph.D. in Statistics.

STAT 713. Introduction to Data Science. 3 Credits.

Large Scale Data Manipulation, Data Management, Big Data Construction using Probabilistic and Machine Learning Data Linkage, Web Crawling, Parallel Statistical Computing, and Transferring Data Between Statistical Software. Prereq: STAT 711. Restrictions: This course is designed for the certificate degree in Big Data Applied Statistics Analysis and it may not be used toward any other statistics degree.

STAT 714. Statistical Big Data Visualization. 3 Credits.

Principles of Data Visualization: charts, tables, line, density curve, and effective presentations using R, SAS, Matlab, and Python. Graphical Methods and Interpretation for Specialized Data Types. Advanced Data Visualization R packages and Software, Dynamic and Interactive Plot, Network Visualization: Twitter API Visualization of Spatial Data: Google Map API. Prereq: STAT 711. Restrictions: This course is designed for the certificate degree in Big Data Applied Statistics Analysis and it may not be used toward any other statistics degree.

STAT 725. Applied Statistics. 3 Credits.

Data description, probability, inference on means, proportions, difference of means and proportions, categorical data, regression, analysis of variance, and multiple comparisons. Prereq: Knowledge of algebra. This course is not intended for statistics or mathematics majors.

STAT 726. Applied Regression and Analysis of Variance. 3 Credits.

Simple and multiple regression, ANOVA tables, correlation, regression diagnostics, selection procedures, analysis of covariance, one-way ANOVA, two-way ANOVA. Prereq: STAT 725.

STAT 730. Biostatistics. 3 Credits.

Logit model, bioassays, clinical trials, designs, and sequential estimation methods. Prereq: STAT 661 and STAT 768.

STAT 732. Introduction to Bioinformatics. 3 Credits.

An introduction to the principles of bioinformatics including information relating to the determination of DNA sequencing. Prereq: STAT 661. Cross-listed with CSCI 732 and MATH 732.

STAT 761. Advanced Regression. 3 Credits.

Multiple regression, analysis of residuals, model building, regression diagnostics, multicollinearity, robust regression, and nonlinear regression. Prereq: STAT 661.

STAT 764. Multivariate Methods. 3 Credits.

Sample geometry; correlation; multiple, partial, canonical correlation test of hypothesis on means; multivariate analysis of variance; principal components; factor analysis; and discriminant analysis. Prereq: STAT 661.

STAT 767. Probability and Mathematical Statistics I. 3 Credits.

Random variables, discrete probability distributions, density functions, joint and marginal density functions, transformations, limiting distributions, central limit theorem. Additional project required.

STAT 768. Probability and Mathematical Statistics II. 3 Credits.

Properties of estimators, confidence intervals, hypotheses testing, Neyman-Pearson lemma, likelihood ratio tests, complete and sufficient statistics. Additional projects required. Prereq: STAT 767.

STAT 770. Survival Analysis. 3 Credits.

Basic methodology in the analysis of Censored Data, two basic types of censoring, parametric estimation, nonparametric estimation, and life table methods. Prereq: STAT 768.

STAT 772. Computational Statistics. 3 Credits.

Assortment of computational statistics and statistical computing techniques. Specific topics include: random variable generation, optimization and root finding, resampling statistics, Monte Carlo methods, statistical graphics, non-linear and generalized least squares, and the EM algorithm. Prereq: STAT 661 and STAT 768.

STAT 774. Generalized Linear Models. 3 Credits.

This course introduces the statistical theory and inference of generalized linear models (GLMs) which deals the cases that the normality of response data is in absence. The course starts from a review of linear regression with matrix approach. The topic includes exponential distribution family, link functions, contingency tables, GLMs, quasi-GLMs, deviance, residuals, model selection and diagnostics. Students are expected to be able to apply GLMs technique to deal with real world problems in diverse areas. Prereq: STAT 768.

STAT 775. Using Statistics in Sports. 3 Credits.

This course explores the use of statistics in various sports including football, basketball, baseball, among others. Research articles in sports statistics will be discussed. Various statistical techniques will be considered. Prereq: STAT 661, 662, 768.

STAT 777. Multivariate Theory. 3 Credits.

Wishart distribution, distribution of Hotelling's T-square and Lambda statistics, cluster analysis, correspondence analysis, principal components, factor analysis, discriminant analysis, multidimensional scaling. Prereq: STAT 764.

STAT 778. Modern Probability Theory. 3 Credits.

Probability theory presented from the measure theoretic perspective. Emphasis on various types of convergence and limit theorems. Discussion of random walks, conditional expectations, and martingales. Prereq: STAT 768 or MATH 750. Cross-listed with MATH 778.

STAT 780. Asymptotics, Bootstrap, and Other Resampling Plans. 3 Credits.

Development of large sample and small sample properties of a variety of estimators. Prereq: STAT 768.

STAT 786. Advanced Inference. 3 Credits.

This course is aimed at providing theoretical tools in mathematical statistics and cultivating students' ability in understanding statistical research papers. Theory of point estimation and asymptotic theory will be covered. Prereq: STAT 768.

STAT 790. Graduate Seminar. 1-3 Credits.**STAT 791. Temporary/Trial Topics. 1-5 Credits.****STAT 793. Individual Study/Tutorial. 1-5 Credits.****STAT 794. Practicum/Internship. 1-15 Credits.****STAT 795. Field Experience. 1-15 Credits.****STAT 796. Special Topics. 1-5 Credits.****STAT 797. Master's Paper. 1-3 Credits.****STAT 798. Master's Thesis. 1-10 Credits.****STAT 840. Introduction to Statistical Design and Analysis of Gene Expression Experiments. 3 Credits.**

Introduction to microarray and next generation sequencing technologies; design of gene expression experiments; normalization methods; methods for identifying differentially expressed genes; multiple testing and false discovery rate; gene category analysis. Prereq: STAT 661, STAT 662. Prereq or Co-req: STAT 671.

STAT 851. Bayesian Statistical Inference. 3 Credits.

Bayesian approach to statistics inference including model estimation and hypothesis test. The topic covers prior and posterior, Bayes estimate, credible interval, risk, Bayes factor, hypothesis testing, Bayesian hierarchical models, and Bayes computational methods. Prereq: STAT 768.

STAT 852. Longitudinal Data Analysis. 3 Credits.

To introduce students to statistical models and methods for the analysis of the longitudinal data, i.e. data collected repeatedly on experimental units over time. The topic covers repeated measurements; event history studies; linear and nonlinear mixed effects models; marginal mean and rate models; joint analysis of longitudinal and survival data. Prereq: STAT 661, STAT 768.

STAT 859. Applied Spatial Statistics. 3 Credits.

Elementary statistical analysis of spatial data are covered. The course is repeatable for credit on a non-standard basis. Prereq: STAT 661, STAT 764 and STAT 768. Co-req: STAT 671.

STAT 860. Statistical Machine Learning. 3 Credits.

This course provides several fundamental concepts and methods in statistical machine learning: linear method for regression, linear method for classification, KNN, regression tree, classification tree, bagging, random forest, boosting, support vector machine, neural networks, K-means clustering. Prereq: STAT 661, STAT 671 and STAT 768.

STAT 899. Doctoral Dissertation. 1-15 Credits.

Theatre Arts (THEA)

THEA 101. Department Participation. 0 Credits.

Fulfillment of various departmental co-curricular obligations. May be repeated.

THEA 110. Introduction to Theatre Arts. 3 Credits.

Basic orientation and historical perspective to the art of theatre. Includes the spectrum of dramatic literature, theatrical production, and performance.

THEA 115. World Film. 3 Credits.

Study of the development and practice of the art of film and its relationship to the theater emphasizing performance and production angles.

THEA 150. Theatre Foundations I. 1 Credit.

Seminar course for first year Theatre majors. Covers various topics related to resume and portfolio building. Meets once a week.

THEA 160. Storytelling. 3 Credits.

Students will explore narrative, story structure, and theatrical storytelling through creative drama and performance techniques. This class will serve as a prerequisite for the Theatre for Young Audiences Ensemble.

THEA 161. Acting I. 3 Credits.

Beginning actors are introduced to basic mental and physical performance skills, stage conventions, and scene work. Emphasis on enhancing the student's spontaneity, imagination, and awareness.

THEA 180. Dramatic Literature and Style I. 3 Credits.

Introductory survey of theatrical performance and dramatic writing from the Greeks through the eighteenth century.

THEA 181. Dramatic Literature & Style II. 3 Credits.

Survey of dramatic literature from 19th century to present, with emphasis on historical and cultural context, production style, and problems inherent in contemporary production.

THEA 194. Individual Study. 1-5 Credits.**THEA 196. Field Experience. 1-15 Credits.****THEA 199. Special Topics. 1-5 Credits.****THEA 210. Theatre Practicum. 1-2 Credits.**

Participation in Theatre NDSU's production season. May be repeated for credit.

THEA 211. Stage Management Practicum and Seminar. 2 Credits.

Practical application of stage management's practices including independent study and mentorship. Students must serve as an assistant stage manager on a mainstage production to enroll in this practicum. May be repeated for credit.

THEA 220. Stagecraft Lab. 1 Credit.

Stagecraft Lab for participation in Theatre NDSU's production season by working hands-on in the scene shop to create scenery and properties. Prereq or Co-req: THEA 270.

THEA 221. Costume Craft Lab. 1 Credit.

Participation in Theatre NDSU's production season by working hands-on in the costume shop. Co-req: THEA 271.

THEA 223. Costume Design Lab. 1 Credit.

Further study and practice of costume design by participating in the preparation of costumes for the Theatre NDSU production season. Co-req: THEA 277.

THEA 224. Lighting and Sound Design Lab. 1 Credit.

Further study and practice of Lighting and Sound Design by participating in the preparation of lighting and sound for the Theatre NDSU production season. Co-req: THEA 276.

THEA 228. Development of Musical Theatre. 3 Credits.

Introduction to Musical Theatre. Lectures provide historical survey. Weekly labs are devoted to active exploration of representative musical theatre repertoire. Cross-listed with MUSC 228.

THEA 230. Introduction to Theatrical Rendering. 3 Credits.

This course will teach students the basics of drawing and rendering for theatrical design practices utilizing various mixed media.

THEA 250. Theatre Foundations II. 1 Credit.

Seminar course for second year Theatre majors. Covers various topics related to auditions/interviews and pursuing careers in theatre. Meets once a week.

THEA 260. Theatre for Young Audiences Ensemble. 3 Credits.

The Theatre for Young Audiences Ensemble will use improvisation, storytelling, and creative drama techniques to create an original play for young audiences. Class will culminate with the ensemble presenting their play in local schools. Prereq: THEA 160.

THEA 262. Introduction to Dance. 1 Credit.

Practicum course expanding the beginning student performer's physical/kinesthetic awareness. Examines basic styles of dance as employed in theatrical presentation (ballet, modern dance, jazz, and/or tap). Basics in theatre dance audition techniques, and choreography.

THEA 263. Dance Studio. 1 Credit.

Introduction to the basic concepts and principles of Lyrical ballet, jazz or tap dance through studio experiences. Each semester will focus on one specific style. May be repeated for credit with change in topic.

THEA 266. Voice and Movement for the Actor. 3 Credits.

An introduction to the theory and practice of ideal vocal production and physical self-use. Exercises are offered addressing breath control, alignment, relaxation, resonance, articulation, projection, and expansion of physical and vocal creative expression. Prereq: THEA 161.

THEA 267. Acting for the Camera. 3 Credits.

An introductory examination and exploration of the technique of acting for the camera. This class is a practical studio course where students take their acting skills and adapt them for the use of camera acting. Prereq: THEA 161.

THEA 268. Acting the Song I. 3 Credits.

Study and application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (1 semester). Co-req: THEA 161.

THEA 270. Stagecraft. 3 Credits.

An introduction to the crafts and technologies used in the production of scenery, lighting and sound in the theatre. Three 1-hour lectures, one 2-hour laboratory.

THEA 271. Costume Craft. 3 Credits.

Introduction to the techniques used for constructing costumes for theatre. 3 lectures, 1 two-hour laboratory.

THEA 272. Drawing for the Theatre. 3 Credits.

Introduction to drawing for the theatre to include hand and computer-assisted drafting techniques.

THEA 274. Introduction To Stage Design. 3 Credits.

Translation of text and music into ideas for stage design (scenery, costumes, lights) and introduction to use of both traditional and modern technologies in the process.

THEA 275. Theatrical Makeup Design. 3 Credits.

Fundamentals of stage makeup.; facial analysis and introduction to materials and techniques. Character interpretation through two and three-dimensional application.

THEA 279. Scenic Painting. 3 Credits.

This course covers basic scenic painting techniques and common practices.

THEA 280. World Theatre. 3 Credits.

Survey of the theatre and drama of various European and non-Western cultures.

THEA 291. Seminar. 1-5 Credits.**THEA 292. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 294. Individual Study. 1-5 Credits.**THEA 296. Field Experience. 1-15 Credits.****THEA 299. Special Topics. 1-5 Credits.****THEA 301. Musical Theatre Troupe. 1 Credit.**

A select performance ensemble of 10-20 students. Students will develop, do research on, and present songs and choreography from musical theatre productions. By audition and permission of instructor. May be repeated.

THEA 345. Devising. 3 Credits.

Development and application of skills required to create and perform innovative devised performances.

THEA 350. Theatre Foundations III. 1 Credit.

Seminar course for third year Theatre majors. Covers topics related to building the skills necessary to find work as a theatre professional. Meets once a week.

THEA 361. Acting III: Advanced Realism. 3 Credits.

Advanced studies in realistic acting technique and scene work. Course open to student with BFA-standing only. Prereq: THEA 261.

THEA 362. Dance Styles for Theatre. 2 Credits.

Intermediate study of the concepts and principles of ballet, tap and lyrical/jazz through studio practice and performance. May be repeated for credit. Restrictions: BFA MT permission of the Instructor or Head of the Dept.

THEA 363. Dance Studio II. 2 Credits.

Intermediate study in the study of the concepts and principles of ballet, modern, jazz, or tap dance through studio practice and performance. May be repeated for credit. Prereq: THEA 263.

THEA 364. Advanced Acting. 3 Credits.

Practical application of fundamental skills to textual work. Prereq: THEA 161.

THEA 365. Directing I. 3 Credits.

Introduction to the creative process of directing. Focus on script analysis, basic directing tools, and scene work. Prereq: THEA 161.

THEA 367. Acting the Song. 3 Credits.

Study and application of the integration of acting and singing techniques. This class will focus on developing the skills necessary for integrating acting methodologies with musical theatre songs and voice work. Students will explore emotional truth and embodied choices in combination with vocal dynamics to communicate effective storytelling. Prereq: MUSC 167 (1 semester), THEA 161 and students must be Theatre or Music majors only.

THEA 368. Business of Acting. 3 Credits.

Advanced study in business of acting, addressing resume/portfolio, photos, audition package/interviews, agents, unions, graduate programs, national theatre organizations, and audition resources. Prereq: BFA standing, THEA 261, THEA 266.

THEA 370. Technical Theatre Production. 1-3 Credits.

Advanced study in technical theatre production. Emphasis on planning and realization of technical theatre elements. Hours arranged as appropriate to assignment. Student should consult with instructor on number of credits to take. May be repeated for credit.

THEA 371. Introduction to Design: Scenic Design. 3 Credits.

This course introduces students to scenic design for the stage through play analysis, research, preliminary sketches, drafting, paint elevations and model building.

THEA 373. Lighting and Sound Design for the Theatre. 3 Credits.

An introduction to the art of theatrical lighting and sound design.

THEA 375. Costume Design for the Theatre. 3 Credits.

Introduction to the principles and practices of costume design for the theatre through script analysis, research, fabric selection, and sketching.

THEA 376. Theatrical Design Studio I: Theatrical Drawing and Rendering. 3 Credits.

Drawing and rendering techniques for theatrical designers.

THEA 377. Theatrical Design Studio II: Collaboration of the Designer. 3 Credits.

Development of collaboration, enhancement of design theory, and advanced practice of the design process.

THEA 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

THEA 381. Technical Theatre Seminar. 1 Credit.

A detailed study into the different technologies and processes involved in the technical areas of theatrical production. Each class will involve concentrated study in one category of technical production skills. May be repeated for credit.

THEA 386. Theatrical Design Studio III; Design for Alternative Venues. 3 Credits.

Advanced study, studio practice and critique. Development of concept and content for alternative venues. Prereq: THEA 286, THEA 287.

THEA 387. Theatrical Design Studio IV; Research in the Studio. 3 Credits.

Advanced study, studio practice and critique. Emphasis on research techniques, professional practice, and presentation. Prereq: THEA 286, THEA 287.

THEA 391. Seminar. 1-5 Credits.**THEA 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 394. Individual Study. 1-5 Credits.**THEA 396. Field Experience. 1-15 Credits.****THEA 397. Co-op Internship. 1-5 Credits.****THEA 399. Special Topics. 1-5 Credits.****THEA 450. Capstone Experience. 3 Credits.**

Demonstration of mastery in selected area of theatre through an advanced project in acting, directing, design/technical theatre, or dramaturgy. Departmental capstone experience. Prereq: Senior standing.

THEA 461. Acting Shakespeare. 3 Credits.

Advanced training in techniques for analysis, preparation and performance of Shakespeare's plays and sonnets. Prereq: BFA standing with emphasis in Performance, THEA 261, THEA 266.

THEA 462. Acting Styles. 3 Credits.

Introduction to various major performance styles, ranging from Greek tragedy through twentieth century nonrealism. Styles covered include Greek, French neoclassical, Brechtian epic theatre, and absurdism. Prereq: THEA 261.

THEA 463. Acting the Song II. 3 Credits.

Advanced study and application of the integration of acting and singing techniques. This class will focus on a deeper development of the skills necessary for integrating acting methodologies with musical theatre song and voice work. Students will continue to explore emotional truth and embodied choices in combination with vocal dynamics to communicate effectively to an audience. Prereq: THEA 367 and restricted to Theatre and Music majors only.

THEA 465. Directing II. 3 Credits.

Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. Prereq: THEA 365. {Also offered for graduate credit - see THEA 665.}.

THEA 466. Advanced Voice for the Actor. 3 Credits.

Intensive examination/development of the vocal mechanism. Focus on consonant/vowel production, diction/articulation, resonance/placement, and breath/posture complemented by introduction of IPA, character voices, and dialects. Prereq: BFA standing in Performance Track, THEA 266.

THEA 467. Advanced Movement for the Actor. 3 Credits.

Advanced level movement course introducing codified styles of theatre movement including neutral and character mask, pedestrian mime, unarmed and armed stage combat Prereq: BFA standing, THEA 266.

THEA 469. Musical Theatre Audition. 3 Credits.

Designed to give students confidence and integrity for auditions in the realm of musical theatre, with a focus on choosing appropriate material and preparation for the audition and performance. Through a process driven approach of active investigation through repertoire the actor will gain skills to prepare and present a dynamic Musical Theatre audition. The actor will understand the appropriate audition etiquette expected of them to have successful career in the industry. Prereq: THEA 228, THEA 367, and THEA 463.

THEA 480. History and Literature of Theatre I. 3 Credits.

Historical study of theatre architecture, staging methods, individual artists and plays from classical Greece to contemporary times. Prereq: THEA 180.

THEA 481. History and Literature of the Theatre II. 3 Credits.

Historical study of theatre architecture, staging methods, individual artists and plays from the 18th century to the present. Prereq: THEA 480.

THEA 485. Directing III. 3 Credits.

Active practice and investigation in building rehearsal, conducting analysis, and collaborating with actors. Prereq: THEA 465.

THEA 486. History of Dress and Decor I; the Foundations of Western Style. 3 Credits.

Survey of historical architecture, interiors, and clothing beginning with antiquity through the 18th century.

THEA 487. History of Dress and Decor II; Western Style since 1800. 3 Credits.

Survey of historical architecture, interiors, and clothing after 1800 through the 1970s.

THEA 491. Seminar. 1-5 Credits.**THEA 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

THEA 494. Individual Study. 1-5 Credits.**THEA 494H. Individual Study. 1-3 Credits.****THEA 496. Field Experience. 1-15 Credits.****THEA 499. Special Topics. 1-5 Credits.****THEA 665. Directing II. 3 Credits.**

Problems in directing, formulating production concepts, casting, working with actors, and aiding characterization. Includes preliminary work with thrust and arena staging. {Also offered for undergraduate credit - see THEA 465.}.

THEA 797. Master's Paper. 1-3 Credits.

Transportation & Logistics (TL)

TL 116. Business Software Applications. 3 Credits.

Exploration of how microcomputers are used in business with an emphasis in developing proficiency in Microsoft Excel and introduction to Microsoft Access. Credit will be awarded only for TL 116, CSCI 114, or CSCI 116 but not more than one.

TL 320. Integrated Supply Chain Management. 3 Credits.

Identification of the key elements in a firm's management of their supply chain. Theory and practical applications for analyzing and developing strategies to assist firms in obtaining and maintaining a competitive advantage. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

TL 330. Supply Chain Analysis and Analytics. 3 Credits.

Introduction to quantitative tools for compiling, presenting, and analyzing, numerical data to make inferences and decisions in the face of uncertainty. In addition, an understanding and application of analytics to large data. These tools are needed by all supply chain professionals. Prereq: TL 116 and restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

TL 360. Operations Management. 3 Credits.

Study and application of concepts and managerial techniques for manufacturing and service operations. Includes production technology, facility location/layout, inventory management, MRP, just-in-time manufacturing, and total quality management. Prereq: MGMT 320, STAT 330 and MATH 144 or MATH 146. Restricted to College of Business professional major or minor and a 2.50 minimum NDSU grade point average.

TL 462. Modeling the Supply Chain. 3 Credits.

Development of spreadsheet models representing different positions in the supply chain. The models can be used to enhance decision making and achieve a better understanding of how the different stages in a supply chain interact. Prereq: MGMT 320, STAT 330 and at least a cumulative GPA of 2.50.

TL 711. Supply Chain Systems. 3 Credits.

Foundation material critical to establishing effective supply chains in various decision making environments. Topics include inventory theory, forecasting, aggregate planning, and project management. Decision making techniques include linear programming, process flow analysis, and simulation.

TL 715. Introduction to ERP. 3 Credits.

This course introduces students to Enterprise Systems and their implementation. Topics covered include: process integration, value chain management, change management, project management, and knowledge management.

TL 719. Crisis Analysis and Homeland Security. 3 Credits.

Provides an integrated approach to crisis analysis and response within the contexts of military logistics and homeland security. Focus is on the social and cultural context of emergencies, disasters and catastrophes.

TL 721. Global Supply Chain Management. 3 Credits.

This course provides a coherent perspective on contemporary global logistics from raw materials through production to the customer. Addresses the roles of governments and intermediaries, international sourcing and the application of local trade laws. Discussion of economic, political, and social issues that may affect international transportation. Prereq: TL 711.

TL 725. ERP Configuration. 3 Credits.

Examines the impact of sensor network systems driving business data collection, and the configuration of Enterprise Systems. Includes peer reviewed articles pertaining to enterprise network system application theory with a focus on supply chain systems. Prereq: TL 715.

TL 731. Logistics Decision Analysis. 3 Credits.

This course covers collection, management and analysis of logistics information necessary to make good decisions as well as quantitative decision analysis models for systematic evaluation of decision situations involving uncertainty, complexity, alternatives, and preferences.

TL 733. Case Studies in Supply Chain. 3 Credits.

This course will focus on actual supply chain cases along with solutions and how individual/organizational decisions relate to the ultimate outcome. Analyzing processes which would have reduced/eliminated the supply chain's susceptibility to success or failure.

TL 735. Practical Data Analytics. 3 Credits.

This course provides a comprehensive overview of data analytics and business intelligence concepts with practical experience using market-leading enterprise software solutions. Topics include data management, the extract-transform-load process, data cleansing, data reporting and visualization, building dashboards, development and use of online analytical processing (OLAP) cubes, data warehouses, and data mining.

TL 751. Transportation Cyber-Physical Security. 3 Credits.

Fundamentals of multimodal transportation physical security and cybersecurity, governance, standards, and best practices.

TL 752. Transportation Planning and Environmental Compliance. 3 Credits.

This course provides an overview of the procedures of transportation planning and environmental compliance, to include an understanding of the related policies and procedures as they relate to transportation systems, and compliance with local, state, and federal laws. A discussion of emissions, hazardous cargo, and permitting also will be provided.

TL 754. Urban Transportation Systems Analysis. 3 Credits.

This course provides students with an understanding of system analysis tools used in urban transportation. Students will work with analytical techniques employed in urban transportation planning, such as traffic forecasting and system capacity analysis and apply these techniques using real-world data for analyzing both the demand and supply of transportation.

TL 755. Context Sensitive Solutions. 3 Credits.

Examine traditional transportation engineering factors, impacts on communities, and natural and human environments. Introduce students to principles of CSS and allow them to learn how they are applied through case studies and demonstrated principles.

TL 756. Transportation and Land Use Integration. 3 Credits.

This course provides students with an understanding of the interrelationships that exist between land use and transportation and the related impacts to the economy, environment and to society as a whole in the planning context.

TL 757. Intelligent Transportation Solutions. 3 Credits.

Fundamentals and field studies of information technologies deployed and emerging to address critical transportation issues such as congestion, safety, security, and energy efficiency.

TL 785. Spatial Analysis in Transportation. 3 Credits.

This course focuses on applications of Geographic Information Systems (GIS) to transportation networks and problems. The emphasis is on data modeling. Topics include: linear referencing, dynamic segmentation, network analysis, urban and land use planning, routing of hazardous materials, and asset management applications.

TL 786. Public Transportation. 3 Credits.

Focuses on public transportation issues and models. Topics include: policy issues, government's role in transit, transit planning, demand forecasting, performance evaluation, and system costing. Students will work on projects directly related to a transit system.

TL 787. Public Transportation II. 3 Credits.

This course focuses on concepts and modeling procedures used when planning and operating public transportation systems. Topics covered include transit demand analysis, quality of service concepts and estimation, bus and rail capacity, and service planning. Prereq: TL 786.

TL 789. Leadership for Transportation & Supply Chain Professionals. 3 Credits.

This course focuses on exploring theories, concepts, and practices of leadership and their application to transportation and supply chain issues. The most current leadership theories and practices will be examined and applied to the discipline the student is pursuing.

TL 790. Graduate Seminar. 1-5 Credits.**TL 791. Temporary/Trial Topics. 1-5 Credits.****TL 792. Graduate Teaching Experience. 1-6 Credits.****TL 793. Individual Study. 1-5 Credits.****TL 794. Practicum/Internship. 1-8 Credits.****TL 795. Field Experience. 1-10 Credits.****TL 796. Special Topics. 1-5 Credits.****TL 797. Master's Paper. 1-3 Credits.****TL 798. Master's Thesis. 1-10 Credits.****TL 811. Modeling for Logistics Research. 4 Credits.**

Models used in logistics research are studied. Topics include statistical models, mathematical programming, network models, stochastic decision processes, and simulation. The ability to perform and present logistics research is cultivated.

TL 831. Modeling for Transportation and Logistics Decision Analysis. 3 Credits.

This course emphasizes critical thinking skills and excel spreadsheet modeling skills to solve, and analyze logistics and transportation issues. It includes an introduction to modeling, excel, add-in tools, optimization, and uncertainty analysis. Prereq: ENGR 770.

TL 881. Mixed Methods in Transportation Research. 3 Credits.

This introduction to mixed methods research (MMR) focuses on integrating qualitative and quantitative data to capture stakeholder perspectives in investigating research questions. Learning how to strengthen research with a variety of techniques is valuable in addressing complex research questions. Students will study MMR concepts, strategies and practices in the field of transportation. The course will also cover formulating research problems, selecting appropriate data, choosing proper research method design, and applying the mixed methods design in transportation program planning and policy decisions.

TL 882. Highway Planning and Logistics. 3 Credits.

This course provides an overview of highway transportation system, including: relationships between transportation, the motor vehicle industries, the economy, environment, and land use. Topics are focused on highway and freight transportation including: demand, capacity, cost, service, and investment analysis.

TL 883. Introduction to Rail Transportation. 3 Credits.

This course provides an overview of rail transportation and industry including: rail transportation system components, regulations, organizations, the economy, environmental considerations, operations, route analysis, line capacities, technology, and multimodal freight issues. The emphasis is on railway and freight transportation including: planning, operations, capacity, sustainability and environmental considerations. Prereq: TL 882.

TL 885. Spatial Analysis in Transportation & Logistics. 3 Credits.

Fundamentals of geospatial analysis and optimization with applications in transportation and logistics. Highlighted topics include mobility optimization, logistical distribution balancing, facility coverage optimization, spatial autocorrelation, and spatial regression.

TL 888. Research in Transportation and Logistics. 3 Credits.

This course focuses on the conduct of scientific research in transportation and the application of a wide range of quantitative methods to transportation problems. The emphasis is on selecting the appropriate techniques for a problem and integrating them into interdisciplinary models. Critical research issues are highlighted.

TL 892. Graduate Teaching Experience. 1-6 Credits.**TL 893. Individual Study/Tutorial. 1-5 Credits.****TL 899. Doctoral Dissertation. 1-15 Credits.**

Tribal and Indigenous Peoples Studies (TIPS)

TIPS 101. Introduction to Native American & Indigenous Studies. 3 Credits.

An overview of the study of Indigenous peoples, including Native societies prior to the arrival of Europeans; contact and colonialism; Indigenous knowledge systems, nationalism, and sovereignty; and contemporary Native issues.

TIPS 494. Individual Study. 1-5 Credits.

University, General (UNIV)

UNIV 101. Major Exploration and Academic Planning. 1 Credit.

This course will guide students through the process of exploring academic majors and related careers using a variety of methods. Additionally, students will learn to navigate NDSU resources and technologies as well as integrate success strategies into their college careers. Prereq: Restricted to first-year students only.

UNIV 150. Foundations of Science. 3 Credits.

This course covers basic findings from several scientific fields, including chemistry, physics, geology, biology, and psychology, with an emphasis on the methods of discovery in these disciplines.

UNIV 151. Science and Society. 3 Credits.

Explores interplay between scientific, economic, and political aspects of technically based, possibly politically contentious, societal challenges. Aims to instill appreciation for breadth, complexity of emerging societal challenges; need for collaboration among disciplines to realize solutions.

UNIV 189. Skills For Academic Success. 1 Credit.

This course is designed to ease the transition for new students at NDSU. Students will learn skills and techniques used by successful college students. In addition to introducing the students to campus resources and governance, topics will include study techniques, time management, test taking, note taking, goal setting, wellness, stress management, and career orientation.

UNIV 194. Individual Study. 1-5 Credits.

UNIV 196. Field Experience. 1-15 Credits.

UNIV 199. Special Topics. 1-5 Credits.

UNIV 220. Career and Graduate School Preparation. 1 Credit.

This course, Career and Grad School Prep, will provide developmental strategies for SSS students who are interested in building career readiness skills and who wish to pursue an education beyond a bachelor's degree. This course provides excellent support and guidance for developing a career plan, interviewing techniques, as well as advising on completing graduate school applications and/or job applications. Prereq: Participants in this course must be an enrolled in TRIO SSS at NDSU.

UNIV 291. Seminar. 1-5 Credits.

UNIV 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 294. Individual Study. 1-5 Credits.

UNIV 297. FE/Coop Ed/Internship. 1-15 Credits.

UNIV 299. Special Topics. 1-5 Credits.

UNIV 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

UNIV 391. Seminar. 1-5 Credits.

UNIV 392. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 394. Individual Study. 1-5 Credits.

UNIV 396. Field Experience. 1-15 Credits.

UNIV 397. Fe/Coop Ed/Internship. 1-15 Credits.

UNIV 399. Special Topics. 1-5 Credits.

UNIV 411. Global Learning. 1 Credit.

Development of independent thought and action, identity and values, and intercultural awareness and skills as a global citizen in conjunction with a Global Practicum, international internship, or other abroad program. May be repeated. Standard grading. Prereq: Prior approval by International Student and Study Abroad Services.

UNIV 440. Writing for Scholars, Fellows and Researchers. 1 Credit.

Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Pass/Fail only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for graduate credit - see UNIV 640}.

UNIV 489. Capstone Experience. 3 Credits.

Integrate coursework in student's area(s) of emphasis as stated in their proposal; explore options and apply strategies related to post-graduation career goals. F,S.

UNIV 491H. Seminar. 1-3 Credits.

UNIV 491. Seminar. 1-5 Credits.

UNIV 492. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 494. Individual Study. 1-5 Credits.

UNIV 496. Field Experience. 1-15 Credits.

UNIV 499. Special Topics. 1-5 Credits.

UNIV 499H. Special Topics. 1-5 Credits.

UNIV 640. Writing for Scholars, Fellows and Researchers. 1 Credit.

Students will develop an understanding of the academic genre of grant and fellowship applications by analyzing a specific granting program, practicing the elements required for the application, and submitting a completed application. Satisfactory/Unsatisfactory only. Restrictions: Students must be planning to apply for the grant or fellowship identified in the course section in which they enroll. {Also offered for undergraduate credit - see UNIV 440}.

UNIV 692. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

UNIV 695. Field Experience. 1-15 Credits.

UNIV 720. Scientific Integrity. 1 Credit.

A survey of contemporary issues relating to responsible conduct in research including academic integrity, mentoring, scientific record keeping, and genetic technology. Class sessions will involve student discussion of case studies that emphasizes a particular scientific ethical dilemma.

UNIV 790. Graduate Seminar. 1-5 Credits.

UNIV 791. Temporary/Trial Topics. 1-5 Credits.

UNIV 793. Individual Study/Tutorial. 1-5 Credits.

UNIV 795. Field Experience. 1-15 Credits.

Veterinary Science (VETS)

VETS 101. Student Success Techniques: Veterinary Technology. 1 Credit.

This course is designed to ease the transition for new students. Students will learn skills and techniques used by successful college students. Topics will include: an overview of the Veterinary Technology Program and profession, professional communication, career opportunities, as well as student success basics.

VETS 115. Medical Terminology for the Paraprofessional. 1 Credit.

Medical terminology explored through a systematic study of word parts and the combinations used to build medical terms.

VETS 125. Animal Restraint. 2 Credits.

Study of behavioral characteristics and handling techniques of farm, companion, and laboratory animals.

VETS 194. Individual Study. 1-5 Credits.

VETS 196. Field Experience. 1-15 Credits.

VETS 199. Special Topics. 1-5 Credits.

VETS 249. Veterinary Hospital Information and Procedures. 2 Credits.

Principles of veterinary hospital management and client relations/education. Prereq: Accepted into the professional portion of the Veterinary Technology program.

VETS 255L. Veterinary Diagnostic Imaging Laboratory. 1 Credit.

A laboratory course designed to supplement material covered in the associated VETS 255 lecture. Radiographic positioning, production, and processing will be covered, along with alternative imaging modalities. Prereq: Acceptance into the professional portion of the Veterinary Technology program. Co-req: VETS 255.

VETS 255. Veterinary Diagnostic Imaging. 2 Credits.

The study of diagnostic radiograph production, including: x-ray machine operation, dark room procedures, radiographic positioning, and radiation safety. Ultrasound and other forms of alternative imaging will also be discussed. Prereq: VETS 125, ANSC 218, ANSC 219, VETS 256 and acceptance into the professional Veterinary Technology program. Co-req: VETS 255L.

VETS 265. Veterinary Nursing I. 2 Credits.

Clinical procedures and instrumentation used in the day-to-day operation of a companion animal veterinary practice. Prereq: Must be accepted into the Veterinary Technical program. Co-req: VETS 265L.

VETS 265L. Veterinary Nursing Lab I. 1 Credit.

Hands on practice of clinical procedures and instrumentation use common in the day-to-day operation of a veterinary practice. Co-req: VETS 265 and acceptance into the Veterinary Technology program.

VETS 267L. Veterinary Nursing Lab II. 1 Credit.

Introduction and knowledge expansion of the hands on clinical procedures, instrumentation, animal behaviors, sample collection, necropsy techniques, and disinfection techniques used in the day-to-day operation of a veterinary facility. Prereq: VETS 265, VETS 265L. Co-req: VETS 267.

VETS 267. Veterinary Nursing II. 2 Credits.

Introduction and knowledge expansion of the clinical procedures, instrumentation, animal behaviors, sample collection, and disinfection techniques used in the day-to-day operation of a veterinary facility. Co-req: VETS 267L. Prereq: VETS 265, VETS 265L.

VETS 291. Seminar. 1-5 Credits.

VETS 292. Global Practicum: Study Abroad. 1-15 Credits.

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 294. Individual Study. 1-5 Credits.

VETS 296. Field Experience/Practicum. 1-15 Credits.

VETS 299. Special Topics. 1-5 Credits.

VETS 367L. Principles of Companion Animal Dentistry Lab. 1 Credit.

Basic principles of veterinary dentistry lab. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367.

VETS 367. Principles of Companion Animal Dentistry. 1 Credit.

Basic principles of veterinary dentistry. Including dental anatomy, physiology, pathophysiology, charting, and instrumentation. Techniques of routine dental prophylaxis, periodontal disease therapies, client education, and preventative oral care will be emphasized. Co-req: VETS 367L and must be a student in the professional portion of the Veterinary Technology program. Prereq: VETS 267 and VETS 267L.

VETS 369L. Companion Small Mammal and Exotic Animal Health and Husbandry Laboratory. 1 Credit.

A laboratory course for Veterinary Technology students which is designed to supplement material covered in the associated lecture, VETS 369. Handling, restraint, nursing, and management techniques relating to small mammal and exotic species will be covered. Prereq: VETS 135, VETS 136, VETS 256. Co-req: VETS 369. Restrictions: Current status in the professional curriculum of the NDSU Veterinary Technology Program is required.

VETS 369. Companion Small Mammal and Exotic Animal Health and Husbandry. 2 Credits.

Students will be introduced to the biology, reproduction, and husbandry requirements of domestic small mammal and exotic species. The role these species play in the human animal bond will also be addressed. Prereq: ANSC 218. Restrictions: Students must be of sophomore status and majoring or minoring in Veterinary Technology, Animal Science, or Equine Science.

VETS 379. Global Seminar. 1-6 Credits.

NDSU instructed experience or field study in a foreign country. Conducted in English for residence credit. Pre-requisite: Prior approval by International Student and Study Abroad Services and major department. May be repeated. Standard Grading.

VETS 385. Veterinary Parasitology. 2 Credits.

Study of parasitology principles commonly dealt with in veterinary medicine. Co-req: VETS 385L and acceptance into the professional portion of the Veterinary Technology program.

VETS 385L. Veterinary Parasitology Lab. 1 Credit.

Study of parasitology procedures commonly utilized in veterinary medicine. Co-req: VETS 385 and admission to the professional portion of the Veterinary Technology program.

VETS 386. Veterinary Hematology. 2 Credits.

Study of hematology in mammals with a veterinary medicine emphasis. Co-req: VETS 386L and acceptance into the professional portion of the Veterinary Technology program.

VETS 386L. Veterinary Hematology Lab. 1 Credit.

Study of hematology procedures commonly utilized in veterinary medicine. Co-req: VETS 386 and admission to the professional portion of the Veterinary Technology program.

VETS 387. Veterinary Clinical Pathology. 2 Credits.

A course regarding the study of urine analysis, cytology and serum chemistry principles and procedures commonly utilized in veterinary medicine. Co-req: VETS 387L and acceptance into the professional portion of the Veterinary Technology program.

VETS 387L. Veterinary Clinical Pathology Laboratory. 1 Credit.

Hands-on course regarding the study of urine analysis, cytology and serum chemistry principles and procedures commonly utilized in veterinary medicine. Co-req: VETS 387 and acceptance into the professional portion of the Veterinary Technology program.

VETS 391. Seminar. 1-5 Credits.**VETS 392. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 394. Individual Study. 1-5 Credits.**VETS 399. Special Topics. 1-5 Credits.****VETS 455. Veterinary Applied Pharmacy Practices. 1 Credit.**

Practice of veterinary pharmacology including dose calculations, pharmacy terms, prescribing practices, drug dispensing, and regulations governing drug approval, prescribing and dispensing in veterinary practice. Co-req: VETS 457. Prereq: VETS 386 and admission to the professional portion of the Veterinary Technology program.

VETS 456. Veterinary Pharmacology and Pharmacy Practice. 2 Credits.

Use of drugs in veterinary medicine including commonly used drugs and drug classes and their indications, contraindications and therapeutic effects. Regulations affecting the prescribing and dispensing of drugs in veterinary medicine. Prereq: restricted to Pharmacy majors only.

VETS 457. Veterinary Pharmacology. 2 Credits.

Students will learn about veterinary drugs, how they work, and how they are used, so that students can safely, knowledgeably, and confidently administer and dispense drugs in veterinary practice. Co-req: VETS 455. Prereq: Acceptance into the professional portion of the Veterinary Technology program.

VETS 460L. Veterinary Anesthesiology Lab. 1 Credit.

Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 357, VETS 385, VETS 386 and students must be admitted to the professional portion of the Veterinary Technology program. Co-req: VETS 460.

VETS 460. Veterinary Anesthesiology. 2 Credits.

Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: VETS 357, VETS 385, VETS 386 and students must be admitted to the professional portion of the Veterinary Technology program. Co-req: VETS 460L. Restrictions: Must be a student in the professional portion of the Veterinary Technology program.

VETS 461L. Veterinary Surgical Techniques Laboratory. 1 Credit.

Preparation for assistance with veterinary surgical procedures. Provisions of proper aftercare for veterinary surgical patients. Prereq: Acceptance into the Veterinary Technology program. Co-req: VETS 461.

VETS 461. Veterinary Surgical Nursing Techniques. 2 Credits.

Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients. Prereq: Acceptance into the Veterinary Technology program. Co-req: VETS 461L.

VETS 481. Ward Care/Clinic Care. 1 Credit.

Supervised experience managing the care and feeding of Veterinary Technology Program animals and clinical veterinary facilities. May be repeated 4 times. Restrictions: Must be a student in the professional portion of the Veterinary Technology program.

VETS 482. Large Animal Techniques. 2 Credits.

Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256.

VETS 482L. Large Animal Techniques Laboratory. 1 Credit.

A laboratory course designed to supplement material covered in VETS 482. Handling, restraint, nursing, and management techniques used in large animal veterinary practice. Primarily focused on cattle and horses. Prereq: VETS 256. Co-req: VETS 482.

VETS 483. Clinical Veterinary Practicum. 1 Credit.

A case based course designed to pull together the knowledge learned in lectures and the skills taught in labs throughout the Veterinary Technology program. Restrictions: Must be accepted into the Veterinary Technology program.

VETS 485. Veterinary Technology Externship. 3 Credits.

This course is the capstone experience for veterinary technology students. This course involves continued development of skills and application of knowledge through supervised work in a veterinary practice or other appropriate clinical setting. Refer to the Department of Animal Sciences for further information regarding the Veterinary Technology program. Prereq: VETS 367, VETS 367L, VETS 369, VETS 460, VETS 460L, VETS 461, VETS 461L.

VETS 491. Seminar. 1-5 Credits.**VETS 492. Global Practicum: Study Abroad. 1-15 Credits.**

Pre-Arranged study at accredited foreign institutions (study abroad), domestic institutions (National Student Exchange) or on approved study abroad programs. Pre-requisite: Sophomore standing and prior approval by International Student and Study Abroad Services and major department. Graded 'P' or 'F' (Undergraduate), or 'S' or 'U' (Graduate).

VETS 494. Individual Study. 1-5 Credits.**VETS 496. Field Experience. 1-15 Credits.****VETS 499. Special Topics. 1-5 Credits.**

Women and Gender Studies (WGS)

WGS 110. Introduction to Women's Studies. 3 Credits.

Exploration of a range of social/domestic and global issues related to women; development of a feminist framework for thinking and writing about woman and gender.

WGS 112. Introduction to Masculinities. 3 Credits.

Exploration of the lives of men and boys and the diverse experiences and public discourses about masculinity; the role of men and boys in sports, family, work and other social relationships.

WGS 194. Individual Study. 1-5 Credits.**WGS 199. Special Topics. 1-5 Credits.****WGS 294. Individual Study. 1-5 Credits.****WGS 340. Perspectives in LGBTQ Studies. 3 Credits.**

Exploration of sexual orientation, gender identity, and bodies from multiple contemporary feminist and queer perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in LGBTQ studies. Recommended prereq: WGS 110 or WGS 112.

WGS 350. Perspectives in Women's Studies. 3 Credits.

Exploration of women and gender from many perspectives. Course provides an opportunity to increase knowledge of the scholarship and writings in Women's Studies, including authors such as Friedan, Baumgardner and Richards, Wolf, and Roiphe. Prereq: WGS 110.

WGS 370. Transnational/Global Women. 3 Credits.

Understanding women's lives within the contemporary context of transnationalism, where the local and the global are integrally linked and perspectives are informed by gender, race, class, sexuality, and nationality. Co-req: WGS 110.

WGS 394. Individual Study. 1-5 Credits.**WGS 399. Special Topics. 1-5 Credits.****WGS 426. Women in American History. 3 Credits.**

A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with HIST 426. {Also available for graduate credit - See WGS 626.}

WGS 489. Internship/Capstone. 3 Credits.

Integrate coursework taken in Women's Studies major; apply knowledge to women's events and experiences; explore career and graduate options in the field of Women's Studies.

WGS 491. Seminar. 1-5 Credits.

WGS 494. Individual Study. 1-5 Credits.

WGS 496. Field Experience. 1-15 Credits.

WGS 499. Special Topics. 1-5 Credits.

WGS 626. Women in American History. 3 Credits.

A survey of political, social, economic, and cultural development of American women from colonial times to the present with a focus on the lived experiences of diverse groups of women. Central themes are: the incongruity of ideal and reality, the fluidity of gender expectations and the "public" sphere, women's ability to navigate different power structures successfully, work and sexual division of labor, and the role family and personal life. Cross-listed with HIST 626. {Also offered for undergraduate credit - See WGS 426.}.

WGS 790. Graduate Seminar. 1-5 Credits.

Zoology (ZOO)

ZOO 797. Master's Paper. 1-3 Credits.

ZOO 798. Master's Thesis. 1-10 Credits.

ZOO 899. Doctoral Dissertation. 1-15 Credits.

Graduate Faculty

Full Graduate Faculty

Graduate education is dedicated to the continued scholarship and professional development of our students. The Graduate College at NDSU sets as the defining principle of graduate education the formation of a special professional relationship between students and program faculty. This professional relationship culminates through mentorship that is developed between a student and a faculty mentor.

In recognition of the role of graduate education, and the importance of mentorship, the Graduate College identifies individuals as being members of the Graduate faculty. This faculty should teach and mentor graduate students. Programs should strive to have courses taught by Graduate Faculty members and student advisory committees composed of Graduate Faculty members. Graduate Faculty status confers certain rights, privileges, and responsibilities to individuals holding this status. The following sections define the various recognized levels of Graduate Faculty membership and the rights pertaining to each.

Full Member of the Graduate Faculty

Full-status members of the Graduate Faculty of North Dakota State University (NDSU) consist of all persons who hold a probationary (tenure-track) or tenured appointment and have been appointed to the rank of Assistant Professor, Associate Professor, or Professor in an academic unit or program area at NDSU.

A full-status member of the Graduate Faculty of NDSU may teach graduate courses, serve as a member of supervisory committees, chair supervisory committees, serve as the Graduate College appointee to supervisory committees, serve as a member of graduate student appeals committees, serve as a member of the Graduate Council, vote at graduate faculty meetings, and serve in any other capacity as required.

Ahmadov, Azar, Professor of Mathematics

Ph.D., 2004, Yale University

Ajmera, Beena, Assistant Professor of Civil & Environmental Engineering

Ph.D., 2015, Virginia Polytechnic Institute and State University

Al Asady, Ahmad, Assistant Professor of Management and Marketing

Ph.D., 2020, Kent State University

Aldrich-Wolfe, Laura, Associate Professor of Biological Sciences

Ph.D., 2006, Cornell University

Alfonseca Cubero, Maria, Associate Professor of Mathematics

Ph.D., 2003, Universidad Autonoma de Madrid

Aly Ahmed, Bakr, Associate Professor of Architecture & Landscape Architecture

Ph. D., 2001, Virginia Polytechnic Institute and State University

Ambrosio, Thomas, Professor of Criminal Justice & Political Science

Ph.D. 2000, University of Virginia

Andrianova, Anastasiya, Associate Professor of English

Ph.D., 2011, City University of New York

Archbold, Carol, Professor of Criminal Justice & Political Science

Ph.D., 2002, University of Nebraska-Omaha

Arnold, Lisa, Associate Professor of English

Ph.D., 2011, University of Louisville

Asa, Eric, Associate Professor of Construction Management & Engineering

Ph.D., 2000, University of Alberta

Asperin, Amelia Adora, Associate Professor of Apparel, Design & Hospitality Management

Ph.D., 2007, Kansas State University

Azarmi, Fardad, Professor of Mechanical Engineering

Ph.D., 2008, University of Toronto

Baggett, Ashley, Associate Professor of History, Philosophy & Religious Studies

Ph.D., 2014, Louisiana State University

Balas, Benjamin, Professor of Psychology

Ph.D., 2007 Massachusetts Institute of Technology

Baldwin, Thomas, Assistant Professor of Plant Pathology

Ph.D., 2013, University of Georgia

Banawi, Abdulaziz Ali H, Assistant Professor of Construction Management & Engineering

Ph.D., 2013, University of Pittsburgh

Bandillo, Nonoy, Assistant Professor of Plant Sciences

Ph.D., 2016, University of Nebraska-Lincoln

Banerjee, Samiran, Assistant Professor of Microbiological Sciences

Ph.D., 2012, University of Saskatchewan

Banerjee, Somnath, Assistant Professor of Management and Marketing
Ph.D., 2015, University of Central Florida

Bano, Sara, Assistant Professor, School of Education
Ph.D., 2018, Michigan State University

Barabanov, Nikita, Professor of Mathematics
Ph.D., 1979, Leningrad University

Barrett, Tracy, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2007, Cornell University

Battocchi, Dante, Assistant Professor of Coatings & Polymeric Materials
Ph.D., 2002, University of Trento

Bauer, Marc, Associate Professor of Animal Science
Ph.D., 1996, University of Kentucky

Bauroth, Nicholas, Professor of Criminal Justice & Political Science
Ph.D., 2003, Loyola University

Beaulier, Scott, Dean, College of Business
Ph.D., 2004, George Mason University

Beck, Stephenson, Professor of Communication
Ph.D., 2008, University of Kansas

Benton, Bradley, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of California Los Angeles

Berg, Eric, Professor of Animal Science
Ph.D., 1996, Purdue University

Berg, Erika, Associate Professor of Animal Science
Ph.D., 2006, University of Missouri

Berti, Marisol, Professor of Plant Sciences
Ph.D., 2007, North Dakota State University

Bertolini, Charles, Professor of Architecture & Landscape Architecture
Ph.D., 2008, Temple University

Bezbaruah, Achintya, Professor of Civil & Environmental Engineering
Ph.D., 2002, University of Nebraska-Lincoln

Bilen-Green, Canan, Professor of Industrial and Manufacturing Engineering
Ph.D., 1998, University of Wyoming

Bitzan, John, Professor of Management and Marketing
Ph.D., 1997, University of Wisconsin-Milwaukee

Blankenship, Anne, Associate Professor of History, Philosophy & Religious Studies
Ph.D., 2012, University of North Carolina at Chapel Hill

Blodgett Salafia, Elizabeth, Professor of Human Development and Family Science
Ph.D., 2008, University of Notre Dame

Boetel, Mark, Professor, School of Natural Resource Sciences
Ph.D., 1996, South Dakota State University

Boonstoppel, Sarah, Assistant Professor of Criminal Justice & Political Science
Ph.D., 2014, University of Maryland, College Park

Borr, Mari, Professor, School of Education
Ph.D., 2005, University of North Dakota

Boudjouk, Philip, Professor of Chemistry and Biochemistry
Ph.D., 1971, University of Wisconsin

Bowsher, Julia, Associate Professor of Biological Sciences
Ph.D., 2007, Duke University

Boynton, Jason, Associate Professor of Mathematics
Ph.D., 2006, Florida Atlantic University

Braaten, Benjamin, Professor of Electrical & Computer Engineering
Ph.D. 2009, North Dakota State University

Brandel, Jennifer, Assistant Professor of Architecture
M.F.A., 2018, California College of the Arts

Brekke, Jeremy, Associate Professor of Music
D.A., 2004, University of North Colorado

Bridgelall, Raj, Assistant Professor of Transportation and Logistics
Ph.D., 2015, North Dakota State University

Briggs, Steven, Associate Professor of Criminal Justice & Political Science
Ph.D., 2007, University of Nebraska-Omaha

Bromley, Kimble, Professor of Visual Arts
M.F.A., 1986, Southern Illinois University

Brotherson, Sean, Professor of Human Development and Family Science

Ph.D., 2000, Oregon State University

Buchanan, David, Associate Dean of Agriculture, Food Systems and Natural Resources

Ph.D., 1979, University of Nebraska-Lincoln

Buchholz Holland, Carol, Associate Professor, School of Education

Ph.D., 2005, Kansas State University

Buettner-Schmidt, Kelly, Professor of Nursing

Ph.D., 2013, University of New Mexico

Bumgarner, Jeffrey, Professor of Criminal Justice & Political Science

Ph.D., 2000, University of Minnesota

Burghaus, Uwe, Associate Professor of Chemistry and Biochemistry

Ph.D., 1995, Free University of Berlin

Burns, Kelly, Assistant Professor of Music

D.M.A., 2018, University of North Carolina at Greensboro

Burt, Sean, Assistant Professor of History, Philosophy & Religious Studies

Ph.D., 2009, Duke University

Byrd, Christopher, Assistant Professor of Animal Science

Ph.D., 2018, Purdue University

Cai, Xiwen, Professor of Plant Sciences

Ph.D., 1998, Washington State University

Cannayen, Igathinathane, Associate Professor of Agricultural & Biosystems Engineering

Ph.D., 1997, Indian Institute of Technology

Carlson, Elizabeth, Assistant Professor of Political Science

Ph.D., 2011, University of California Los Angeles

Carlson, Thomas, Professor of Human Development and Family Science

Ph.D., 2000, Iowa State University

Casey, Francis, Professor, School of Natural Resource Sciences

Ph.D., 2000, Iowa State University

Caton, James, Assistant Professor of Agribusiness and Applied Economics

Ph.D., 2016, James Mason University

Caton, Joel, Professor of Animal Science

Ph.D., 1987, New Mexico State University

Chai, Linlin, Assistant Professor of Management and Marketing

Ph.D., 2016 Iowa State University

Chatterjee, Amitava, Associate Professor, School of Natural Resource Sciences

Ph.D., 2007, University of Wyoming

Chen, Bingcan, Assistant Professor of Plant Sciences

Ph.D., 2012 University of Massachusetts Amherst

Chen, Jun, Associate Professor of Accounting & Information Systems

Ph.D., 2014, University of North Carolina at Charlotte

Choi, Bong-Jin, Assistant Professor of Statistics

Ph.D., 2014, University of South Florida

Choi, Juwon, Assistant Professor of Apparel, Merchandising, Design and Hospitality Management

Ph.D., 2016, Kansas State University

Choi, Yongki, Assistant Professor of Physics

Ph.D., 2010, The City University of New York

Christensen, Bryan, Professor of Health, Nutrition & Exercise Science

Ph.D., 2000, University of Kansas

Christensen, Warren, Associate Professor of Physics

Ph.D., 2007, Iowa State University

Christenson, Michael, Professor of Architecture & Landscape Architecture

M.Arch, 1997, University of Minnesota

Christoffers, Michael, Associate Professor of Plant Sciences

Ph.D., 1998, University of Missouri-Columbia

Chu, Xuefeng, Professor of Civil & Environmental Engineering

Ph.D., 2002, University of California, Davis

Cihacek, Larry, Professor, School of Natural Resource Sciences

Ph.D., 1979, Iowa State University

Ciuperca, Catalin, Professor of Mathematics

Ph.D., 2001, University of Kansas

Colbert, Christopher, Professor of Chemistry and Biochemistry

Ph.D., 2000, Purdue University

Collins, Ross, Professor of Communication

Ph.D., 1992, University of Cambridge

Comez, Dogan, Professor of Mathematics

Ph.D., 1983, University of Toronto

Conwell, Erin, Associate Professor of Psychology

Ph.D., 2009, Brown University

Cook, Gregory, Professor of Chemistry and Biochemistry

Ph.D., 1973, Stanford University

Cooley, Dennis, Professor of History, Philosophy & Religious Studies

Ph.D., 1995, University of Rochester

Cox, John, Professor of History, Philosophy & Religious Studies

Ph.D., 1995, Indiana University

Crary, Sarah, Assistant Professor, School of Education

Ph.D., 2018, University of North Dakota

Crawford Jackson, Elizabeth, Professor of Communication

Ph.D., 2007, University of Tennessee

Creese, John, Associate Professor of Sociology and Anthropology

Ph.D., 2011, University of Toronto

Croll, Andrew, Associate Professor of Physics

Ph.D., 2009, McMaster University

Crutchfield, David, Associate Professor of Architecture & Landscape Architecture

M.Arch., 2004, University of Texas at Austin

Cwiak, Carol, Associate Professor of Emergency Management

J.D., 1995, Western State University

Ph.D., 2009, North Dakota State University

Dahl, Laura, Assistant Professor, School of Education

Ph.D., 2019, Ohio State University

Dahlen, Carl, Associate Professor of Animal Science

Ph.D., 2009, University of Minnesota

Dai, Wenhao, Professor of Plant Sciences

Ph.D., 2001, North Dakota State University

Danielson, Ramona, Assistant Professor of Public Health

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David Misialek, Shannon, Associate Professor of Health, Nutrition & Exercise Science

Ph.D., 2013, Ohio University

Day, Stephanie, Associate Professor of Geosciences

Ph.D., 2012, University of Minnesota

Deal, James, Professor of Human Development and Family Science

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Deckard, Edward, Professor of Plant Sciences

Ph.D., 1970, University of Illinois

DeKeyser, Edward, Professor, School of Natural Resource Sciences

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Del Rio Mendoza, Luis, Professor of Plant Pathology

Ph.D., 1999, Iowa State University

Denton, Alan, Professor of Physics

Ph.D., 1991, Cornell University

Denton, Anne, Professor of Computer Science

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DeSutter, Thomas, Professor, School of Natural Resource Sciences

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Devine, Marc, Assistant Professor of Theatre Arts

M.F.A., 2013, Naropa University

Dochtermann, Edward, Associate Professor of Biological Sciences

Ph.D., 2009, University of Nevada

Dorfmeister, Josef, Associate Professor of Mathematics

Ph.D., 2009, University of Minnesota

Dorsam, Glenn, Associate Professor of Microbiological Sciences

Ph.D., 1998, Virginia Commonwealth University

Dowdell, Thomas, Professor of Accounting & Information Systems

Ph.D., 2004, Temple University

Duda, Meghan, Assistant Professor of Visual Arts

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Duffield, Stacy, Professor, School of Education

Ph.D., 2003, University of North Dakota

Duggan, Katherine, Assistant Professor of Psychology

Ph.D., 2016, University of California Riverside

Duncan, Benton, Professor of Mathematics

Ph.D., 2004, University of Nebraska

Dyer, Neil, Professor of Animal Science

D.V.M., 1995, Iowa State University

Egorov, Ivan, Assistant Professor of Mathematics

Ph.D., 2014, Lomonosov Moscow State University

Elias, Elias, Professor of Plant Sciences

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Emanuelson, Pamela, Associate Professor of Sociology and Anthropology

Ph.D., 2008, University of South Carolina

Engler, Mark, Associate Professor of Theatre Arts

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Estevadeordal, Jordi, Associate Professor of Mechanical Engineering

Ph.D., 1996, University of Houston

Eukel, Heidi, Professor of Pharmacy Practice

Pharm.D., 2008, North Dakota State University

Farahmand, Kambiz, Professor of Industrial & Manufacturing Engineering

Ph.D., 1992, University of Texas

Fellows, Kristen, Associate Professor of Sociology and Anthropology

Ph.D., 2013, University of Pennsylvania

Fier, Tiffany, Associate Professor of Theatre Arts

M.F.A., 2007, Purdue University

Fischer, Dominic, Associate Professor of Architecture & Landscape Architecture

M.L.A., 2011, The Bernard and Anne Spitzer School of Architecture at the City College of New York

Fitzgerald, Margaret, , Professor of Human Development and Family Science

Ph.D., 1997, Iowa State University

Flood, Anthony, Professor of History, Philosophy & Religious Studies

Ph.D., 2003, University of Oklahoma

Flores, J. Paulo, Assistant Professor of Agricultural & Biosystems Engineering

Ph.D., 2008, Federal University of Rio Grande do Sul

Foster, Stephen, Professor, School of Natural Resource Sciences

Ph.D., 1983, University of Waikato

Franzen, David, Professor, School of Natural Resource Sciences

Ph.D., 1993, University of Illinois

Frenzel, Jeanne, Professor of Pharmacy Practice

Pharm.D., 2003, North Dakota State University

Friesner, Daniel, Senior Associate Dean, College of Health Professions

Ph.D., 2000, Washington State University

Friskop, Andrew, Associate Professor of Plant Pathology

Ph.D., 2013, North Dakota State University

Fuller, Heather, Associate Professor of Human Development and Family Science

Ph.D., 2009, University of Michigan

Ganesh Pillai, Rajani, Professor of Management and Marketing

Ph.D., 2009, University of Central Florida

Gao, Zhili, Associate Professor of Construction Management & Engineering

Ph.D., 2004, Iowa State University

Garden-Robinson, Julie, Professor of Health, Nutrition & Exercise Science

Ph.D., 1999, North Dakota State University

Gasch, Caley, Assistant Professor, School of Natural Resource Sciences

Ph.D., 2013, University of Wyoming

Gibbs, Penelope, Associate Professor of Microbiological Sciences

Ph.D., 2001, University of Georgia

Gilblom, Elizabeth, Assistant Professor, School of Education

Ph.D., 2017, Cleveland State University

Gill, Upinder, Assistant Professor of Plant Pathology

Ph.D., 2012, Washington State University
Gillam, Erin, Professor of Biological Sciences
 Ph.D., 2007, University of Tennessee-Knoxville
Gladen, Adam, Assistant Professor of Mechanical Engineering
 Ph.D., 2015, University of Minnesota
Gleye, Paul, Professor of Architecture & Landscape Architecture
 Ph.D., 1983, University of California-Los Angeles
Glower, Jacob, Professor of Electrical & Computer Engineering
 Ph.D., 1988, The Ohio State University
Godavarthy, Ranjit, Assistant Professor of Transportation and Logistics
 Ph.D., Kansas State University
Goldwyn, Adam, Associate Professor of English
 Ph.D., 2010, City University of New York
Gomes, Roberto, Assistant Professor of Pharmaceutical Sciences
 Ph.D., 2011, Universidade de São Paulo
Goos, R, Professor, School of Natural Resource Sciences
 Ph.D., 1980, Colorado State University
Gore, Amy, Assistant Professor of English
 Ph.D., 2019, University of New Mexico
Graham-Bertolini, Alison, Assistant Professor of English
 Ph.D., 2009, Louisiana State University
Gramig, Greta, Associate Professor of Plant Sciences
 Ph.D., 2006 University of Wisconsin Madison
Green, Andrew, Assistant Professor of Plant Science
 Ph.D., 2016, Kansas State University
Green, Roger, Associate Professor of Electrical & Computer Engineering
 Ph.D., 1998, University of Wyoming
Greenlee, Kendra, Professor of Biological Sciences
 Ph.D., 2004, Arizona State University
Greenwood, Torin, Assistant Professor of Mathematics
 Ph.D., 2015, University of Pennsylvania
Greives, Timothy, Associate Professor of Biological Sciences
 Ph.D., 2009, Indiana University
Greub, Charlott, Assistant Professor of Architecture & Landscape Architecture
 M.F.A., 1986, Kunstakademie Düsseldorf
 M.Arch, 1992, Kunstakademie Düsseldorf
Grewell, David, Professor of Industrial & Manufacturing Engineering
 Ph.D., Ohio State University
Guo, Ang, Assistant Professor of Pharmaceutical Sciences
 Ph.D., 2010 Chinese Academy of Sciences
Hackerott, Caroline, Assistant Professor of Emergency Management
 Ph.D., 2016, Oklahoma State University
Hackney, Kyle, Associate Professor of Health, Nutrition & Exercise Science
 Ph.D., 2013, Syracuse University
Hageman, Jeanne, Associate Professor of Modern Languages
 Ph.D., 1991, University of Wisconsin-Madison
Hamilton, Jill, Associate Professor of Biological Sciences
 Ph.D., 2012, University of British Columbia
Hammer, Carolyn, Professor of Animal Science
 D.V.M., 2003, Iowa State University
 Ph.D., 2003, Iowa State University
Hanna, Lauren, Associate Professor of Animal Science
 Ph.D., 2003, Iowa State University
Hanson, Erik, Assistant Professor of Agribusiness & Applied Economics
 Ph.D., 2016, University of Minnesota
Hargiss, Christina, Associate Professor, School of Natural Resource Sciences
 Ph.D., 2009, North Dakota State University
Haring, Stuart, Associate Professor of Chemistry and Biochemistry
 Ph.D., 2004, University of Iowa
Harmon, Jason, Associate Professor, School of Natural Resource Sciences
 Ph.D., 2003, University of Minnesota
Harvey, Mark, Professor of History, Philosophy & Religious Studies

Ph.D., 1986, University of Wyoming

Hassel, Holly, Professor of English

Ph.D., 2002, University of Nebraska - Lincoln

Hatterman-Valenti, Harlene, Professor of Plant Sciences

Ph.D., 1993, Iowa State University

Hawley, D, Associate Professor of Modern Languages

Ph.D., 1999, University of Iowa

Hearne, Robert, Professor of Agribusiness & Applied Economics

Ph.D., 1995, University of Minnesota

Heidinger, Britt, Associate Professor of Biological Sciences

Ph.D., 2007, Indiana University

Hektner, Joel, Professor of Human Development and Family Science

Ph.D., 1996, University of Chicago

Hellevang, Kenneth, Professor of Agricultural & Biosystems Engineering

Ph.D., 1989, North Dakota State University

Hershberger, John, Professor of Chemistry and Biochemistry

Ph.D., 1986, Yale University

Heuer, Loretta, Professor of Nursing

Ph.D., 1995, University of North Dakota

Hill, Brent, Associate Professor, School of Education

Ph.D., 2011, Oklahoma State University

Hinsz, Verlin, Professor of Psychology

Ph.D., 1983, University of Illinois

Hobbie, Erik, Professor of Physics

Ph.D., 1990, University of Minnesota

Hoffman, Meagan, Assistant Professor, Extension Center for 4-H Youth Development

Ph.D., 2016, Oklahoma State University

Hoffman, Travis, Assistant Professor of Animal Science

Ph.D., 2015, Colorado State University

Hong, Michelle, Assistant Professor of Management and Marketing

Ph.D., Virginia Polytechnic Institute and State University

Hong, Yongtao, Associate Professor of Accounting & Information Systems

Ph.D., 2008, Drexel University

Hopkins, David, Professor, School of Natural Resource Sciences

Ph.D., 1997, North Dakota State University

Horsley, Richard, Professor of Plant Sciences

Ph.D., 1988, North Dakota State University

Hovick, Torre, Associate Professor, School of Natural Resource Sciences

Ph.D., 2014, Oklahoma State University

Howatt, Kirk, Associate Professor of Plant Sciences

Ph.D., 1999, Colorado State University

Hsu, Dan, Associate Professor of Management and Marketing

Ph.D., Syracuse University

Huang, Huichi, Associate Professor of Accounting & Information Systems

Ph.D., 2012, Syracuse University

Huang, Ying, Associate Professor of Civil & Environmental Engineering

Ph.D., 2012, Missouri University of Science & Technology

Huseth-Zosel, Andrea, Associate Professor of Public Health

Ph.D., 2014, North Dakota State University

Huseynov, Fariz, Professor of Accounting & Information Systems

Ph.D., 2009, University of Memphis

Ikley, Joseph, Assistant Professor of Plant Sciences

Ph.D., 2018, Purdue University

Iskander, Syeed Md, Assistant Professor of Civil & Environmental Engineering

Ph.D., 2019, Virginia Polytechnic Institute and State University

Irish, Leah, Associate Professor of Psychology

Ph.D., 2011, Kent State University

Isern, Thomas, Professor of History, Philosophy & Religious Studies

Ph.D., 1977, Oklahoma State University

Jackson, Jeremy, Professor of Agribusiness and Applied Economics

Ph.D., 2008, Washington University in St. Louis

Jang, Youjin, Assistant Professor of Construction Management & Engineering

Ph.D., Seoul National University

Jansen, Rick, Associate Professor of Public Health

Ph.D. 2009, University of Minnesota

Jarajapu, Yagna, Associate Professor of Pharmaceutical Sciences

Ph.D. , 2002, Glasgow Caledonian University

Jensen, Jessica, Associate Professor of Emergency Management

Ph.D., 2010, North Dakota State University

Jeong, Inbae, Assistant Professor of Mechanical Engineering

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Ph.D., 2004, University of Arizona

Jiang, Long, Associate Professor of Mechanical Engineering

Ph.D., 2003, Sichuan University

Johnson, Burton, Professor of Plant Sciences

Ph.D., 1993, North Dakota State University

Johnson, Carrie, Associate Professor of Human Development and Family Science

Ph.D., 2012 Iowa State University

Johnson, Donald, Associate Professor of History, Philosophy & Religious Studies

Ph.D., 2015, Northwestern University

Johnson, Jeffrey, Associate Professor of Psychology

Ph.D., 2008, University of Iowa

Johnson, Pamela Jo, Associate Professor of Public Health

Ph.D., 2004, University of Minnesota

Johnson, Sigurd, Associate Professor of Music

D.M.A., 1999, University of Memphis

Jones, Joseph, Associate Professor of Management and Marketing

Ph.D., 1991, University of Missouri

Jung, Jessica, Associate Professor of Theatre Arts

M.F.A., 2011, De Paul University

Kallmeyer, Alan, Professor of Mechanical Engineering

Ph.D., 1995, University of Iowa

Kandel, Herman, Professor of Plant Science

Ph.D., 1995, North Dakota State University

Karami, Ghodrat, Professor of Mechanical Engineering

Ph.D., 1984, University of London

Katti, Dinesh, Professor of Civil & Environmental Engineering

Ph.D., 1991, University of Arizona-Tucson

Katti, Kalpana, Professor of Civil & Environmental Engineering

Ph.D., 1996, University of Washington

Keogh, Cassie, Associate Professor of Music

D.M.A., 2015, University of Oklahoma

Kessler, Michael, Dean, of College of Engineering

Ph.D., 2002, University of Illinois

Khan, Mohamed, Professor of Plant Pathology

Ph.D., 1998, Clemson University

Kilin, Dmitri, Associate Professor of Chemistry and Biochemistry

Ph.D., 2000, Chemnitz University of Technology

Kilina, Svetlana, Associate Professor of Chemistry and Biochemistry

Ph.D., 2007, University of Washington

Kim, Jiha, Assistant Professor of Biological Sciences

Ph.D., 2006, University of Georgia

Kingsley Westerman, Catherine, Associate Professor of Communication

Ph.D., 2008, Michigan State University

Kirkpatrick, Sarah, Associate Professor of Emergency Management

Ph.D., 2013, North Dakota State University

Kirkwood, Matthew, Professor of Architecture & Landscape Architecture

M.Des., 1993, Harvard University

Klenow, Daniel, Professor of Emergency Management

Ph.D., 1977, University of Notre Dame

Knodel, Janet, Professor of Plant Pathology

Ph.D., 2005, North Dakota State University

Kong, Jun, Professor of Computer Science

Ph.D., 2005, The University of Texas at Dallas
Korcuska, James, Professor, School of Education
 Ph.D., 2000, Kent State University
Krishnan, Sumathy, Professor of Mechanical Engineering
 Ph.D., 1995, Indian Institute of Technology
Krumel, Thomas, Assistant Professor of Agribusiness and Applied Economics
 Ph.D., 2020, University of Connecticut
Kryjevskaja, Lioudmila, Associate Professor of Physics
 Ph.D., 2008, University of Washington
Kryjevski, Andrei, Associate Professor of Physics
 Ph.D., 2004, University of Washington
Laabs, Benjamin, Associate Professor of Geosciences
 Ph.D., 2004, University of Wisconsin-Madison
Langley, Linda, Associate Professor of Psychology
 Ph.D., 1998, University of Minnesota
Lardy, Gregory, Professor of Animal Science
 Ph.D., 1997, University of Nebraska
Larson, Mary, Associate Professor of Health, Nutrition & Exercise Science
 Ph.D., 2008, University of North Dakota
Lawson, Keriann, Assistant Professor of Agribusiness and Applied Economics
 Ph.D., 2021, West Virginia University
Layek, Buddhadev, Assistant Professor of Pharmaceutical Sciences
 Ph.D., 2014, North Dakota State University
Le Trung, Assistant Professor of Civil & Environmental Engineering
 Ph.D., University of Minnesota
Le, Trung, Assistant Professor of Industrial & Manufacturing Engineering
 Ph.D., 2013, Oklahoma State University
Leclerc, Estelle, Associate Professor of Pharmaceutical Sciences
 Ph.D., 1994, University of Paris XI
Lee, Chiwon, Professor of Plant Sciences
 Ph.D., 1977, Purdue University
Lee, Jaeha, Professor of Apparel, Design & Hospitality Management
 Ph.D., 2008, University of Minnesota
Lehmborg, Derek, Professor of Management and Marketing
 Ph.D., 2010, University of Western Ontario
Leontyev, Alexey, Assistant Professor of Chemistry and Biochemistry
 Ph.D., 2015, University of Northern Colorado
Lepper, Kenneth, Professor of Geosciences
 Ph.D., 2001, Oklahoma State University
Lewis, Todd, Professor, School of Education
 Ph.D., 2002, Kent State University
Li, Deying, Professor of Plant Sciences
 Ph.D., 2001, Iowa State University
Li, Jin, Professor of Management and Marketing
 Ph.D., 2007, University of Alberta
Li, Juan, Professor of Computer Science
 Ph.D., 2008, University of British Columbia
Lim, Siew, Professor of Agribusiness & Applied Economics
 Ph.D., 2005, University of Georgia
Lima, Ivan, Associate Professor of Electrical & Computer Engineering
 Ph.D., 2003, University of Maryland, Baltimore County
Limb, Ryan, Associate Professor, School of Natural Resource Sciences
 Ph.D., 2008, Oklahoma State University
Lin, Wei, Associate Professor of Civil & Environmental Engineering
 Ph.D., 1992, State University of New York at Buffalo
Lin, Zhibin, Assistant Professor of Civil & Environmental Engineering
 Ph.D., 2010, University of Wisconsin at Milwaukee
Lin, Zhulu, Associate Professor of Agricultural & Biosystems Engineering
 Ph.D., 2003, University of Georgia
Littmann, Friedrich, Professor of Mathematics
 Ph.D., 2003, University of Illinois at Urbana-Champaign
Liu, Guodong, Associate Professor of Chemistry and Biochemistry

Ph.D., 2001, Hunan University

Liu, Zhaohui, Associate Professor of Plant Pathology

Ph.D., 2006, North Dakota State University

Lu, Pan, Associate Professor of Transportation and Logistics

Ph.D., 2011, North Dakota State University

Lu, Shuning, Assistant Professor of Communication

Ph.D., 2019, University of Texas at Austin

Ludwig, Simone, Professor of Computer Science

Ph.D., 2004, Brunel University

Macintosh, Gerrard, Professor of Management and Marketing

Ph.D., 1992, University of Nebraska-Lincoln

Mack, Kyle, Associate Professor of Music

D.A., 1992, Ball State University

Mackey, Hollie, Associate Professor, School of Education

Ph.D., 2010, Pennsylvania State University

Maddock, Robert, Professor of Animal Science

Ph.D., 2000, Texas A & M University

Maddock Carlin, Kasey, Associate Professor of Animal Science

Ph.D., 2005, Iowa State University

Magel, Kenneth, Professor of Computer Science

Ph.D., 1977, Brown University

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Ph.D., 1982, University of Missouri-Rolla

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Ph.D., 1995, University of Florida

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Ph.D., 2008, University of Southern California

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Ph.D., 2014, University of Texas at Austin

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Ph.D., 1992, Case Western Reserve University

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Ph.D., 1993, Iowa State University

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Ph.D., 1985, North Dakota State University

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Ph.D., 2013, University of Washington

Wang, Xinnan, Associate Professor of Mechanical Engineering

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Ph.D., 2007, University of Maryland at College Park

Ward, Alison, Associate Professor of Animal Science

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Weber, Michael, Professor of Music

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Ph.D., Zhejiang University

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Ph.D., 2006, University of Akron

Yang, Zhongyu, Associate Professor of Chemistry and Biochemistry

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Yellavajjala, Ravi Kiran, Assistant Professor of Civil & Environmental Engineering

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Ph.D., 2014, North Carolina Agricultural and Technical State University

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Zuk, Alan, Associate Professor of Plant Sciences

Ph.D., 2005, Kansas State University

Other qualified individuals who are not Full Graduate Faculty Members may contribute to the scholarship and professional development of our graduate students. Affiliate Members of the Graduate Faculty are qualified by educational background and experience to effectively teach and mentor students in graduate programs at NDSU. An appointment for Affiliate Graduate Faculty status is initiated by a graduate program. The chair, head, or director of the academic unit in which the program resides will submit the Affiliate Graduate Faculty Nomination form (<https://powerforms.docusign.net/b51d1f0b-7075-44f9-be79-59648eeac0d0/?env=na3&acct=1ceb9a57-b6a3-4df7-b655-d64cf8f1c2d7>) and a current curriculum vitae. The request should include the level of Affiliate Faculty Membership the program proposes the applicant should be given. This request is forwarded to the dean of the academic college in which the program resides for approval. If approved, the request is submitted to the College of Graduate and Interdisciplinary Studies. The request will be reviewed by a subcommittee of the Graduate Council which will make a recommendation to the Dean of the College of Graduate and Interdisciplinary Studies, who will determine whether an appointment will be granted. A reappointment may be granted using the process described above.

Members of the Graduate Faculty who have left the institution may be granted Affiliate Faculty status as outlined below:

- Emeritus Faculty. Persons who are granted emeritus faculty status are eligible for Affiliate Faculty Level 1 status for a period of three years. Membership as an Affiliate Faculty may be renewed upon approval of the Graduate Council and the Dean of the College of Graduate and Interdisciplinary Studies.
- Individuals who have retired or left NDSU for other employment opportunities are eligible serve as chair of supervisory committees for one year. This is not renewable. A department may nominate the individual for Affiliate Faculty status as outlined below.

There are three levels of Affiliate Graduate Faculty Members, the appointment level will be determined by the qualifications of the applicant.

Affiliate Graduate Faculty Level 1

Duties

- Chair committees for graduate students (may be approved to chair committees for Ph.D. programs, professional doctoral programs or both)
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Sustained record of scholarly and/or creative accomplishment, and/or (for professional doctoral programs only) professional practice appropriate to the discipline
- Demonstrated competence in instruction including classroom, advising, or mentoring
- Full-time employment at an NDSU on-campus unit or a Research and Extension Center

Term

- 6 years
- Must demonstrate sustained record of scholarly and/or creative accomplishment
- Demonstrated competence in graduate instruction including classroom, advising, or mentoring

Affiliate Graduate Faculty Level 2

Duties

- Chair committees for all master's students
- Serve as co-chair for all doctoral students (the other co-chair must be a full member of the graduate faculty)
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Record of scholarly or creative accomplishment
- Demonstrated experience in teaching, mentoring, or advising

Term

- 3 years
- Must demonstrate sustained record of scholarly or creative accomplishment
- Demonstrated competence in graduate teaching, advising, or mentoring

Affiliate Graduate Faculty Level 3

Duties

- Chair committees for students not required to complete a dissertation, thesis, or scholarly paper
- Serve on committees for all students
- Teach graduate courses (but no higher than his/her earned degree)

Criteria

- Record of professional achievement in an area related to the program
- Demonstrated competence in teaching

Term

- 3 years
- Must demonstrate sustained record of professional achievement in an area related to the program
- Active involvement in graduate teaching and work with graduate students (but no higher than his/her earned degree)

Graduate Teaching Waivers

Graduate teaching waivers may be granted to individuals who do not meet the requirements for either full or associate graduate faculty status. Teaching waivers only allow individuals to serve as the instructor of record for graduate level courses and carry none of the other privileges of graduate faculty status. Waivers may be granted to qualified individuals who are not students in the department for which the waiver is sought. Graduate teaching waivers may be granted to individuals who do not meet the requirements for either full or associate graduate faculty status. Graduate teaching waivers should be granted sparingly. A request for a waiver should include a rationale for why the individual nominated is the best choice for teaching the particular course. Teaching waivers are most appropriate for elective courses or courses in applied/professional programs for which experiences gained by professionals will provide a valuable educational opportunity for the students. Teaching waivers should not be requested for required courses in a program, unless no other viable alternative exists. The request for teaching waivers should not be seen as a long-term solution to inadequate numbers of tenure-track faculty members. Thus departments will also be asked to explain their long-term plan to fill any deficiencies in their ability to offer courses for which a waiver is requested.

The burden of proof lies with the applying graduate program to show that the nominee holds qualifications that merit the granting of a graduate teaching waiver. A Graduate Teaching Waiver Request form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Graduate_Council_Documents/Graduate_Teaching_Waiver_Request.pdf) must be completed with a current copy of the nominee's curriculum vitae and any other pertinent documentation attached.

Graduate teaching waivers are approved by the Graduate Council and the Dean of the Graduate College. Waivers are granted for one academic year and may be renewed twice at the discretion of the Dean of the Graduate College.

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