



NORTH DAKOTA
STATE UNIVERSITY

NSU

2015/2016
**UNDERGRADUATE AND
GRADUATE BULLETIN**

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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 was named by the Carnegie Commission on Higher Education to the elite "Research University/Very High Research" category, which represents the 108 top-ranked private and public universities in the United States. The classification is a strong recognition of NDSU's position as a national research institution. NDSU is clearly a leader among its peers, and we are pleased The Carnegie Foundation has acknowledged that.

NDSU has more than 14,700 students in our undergraduate and graduate programs. We have more than 2,600 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

About the Bulletin

The **Undergraduate & Graduate Bulletins** contain information about academic programs and student services offered by North Dakota State University. It also 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 (p. 31) 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. 573). 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 **2015-2016 academic year**, beginning on August 24, 2015 and ending on August 5, 2016.
- The undergraduate curricula within the bulletin are effective for students who entered NDSU or who declared a program of study during the **2015-2016 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 (p. 32) and curriculum guides (<https://www.ndsu.edu/registrar/curricula>) may be directed to the Office of Registration and Records (<https://www.ndsu.edu/registrar/contact>). Questions about graduate programs (p. 26) and policies (p. 813) can be directed to the Graduate School (<https://www.ndsu.edu/gradschool>).
- 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/studentlife/StudentCode.pdf>) codes of conduct.
- Information about the Family Educational Rights and Privacy Act of 1974 (<https://www.ndsu.edu/registrar/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 (<http://www.ndsu.edu/makers/procedures/sbhe/default.asp?PID=107&SID=5>): "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 Vice President for Equity, Diversity and Global Outreach (<https://www.ndsu.edu/vpedgo>), 102 Putnam, (701) 231-7708.

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 was named by the Carnegie Commission on Higher Education to the elite "Research University/Very High Research" category, which represents the 108 top-ranked private and public universities in the United States. NDSU is the first and only North Dakota institution to attain the status.

NDSU has enjoyed consistent growth, with enrollment now exceeding 14,700 students in its undergraduate and graduate programs. Annual research expenditures at the university surpass \$150 million.

NDSU plays a significant role in the local economy and serves a region that comprises the entire state of North Dakota and 18 counties in Minnesota within a 100 mile radius of Fargo. According to an economic impact survey conducted by EMSI in 2012, which notes NDSU adds to the local economy \$229.2 million annually through its operations and the nearly 354,400 visitors who came to NDSU during the fiscal year 2010-11. The workforce skills acquired by past and present students who are employed in the regional service area contribute an additional \$655.4 million each year. NDSU's total economic impact to the region is roughly \$884.6 million annually.

In addition, NDSU's 55 acre Research and Technology Park is an award-winning example of success. It is a place where University researchers and private industry can combine their 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, Bobcat, Cargill and Appareo. The Park has a 50,000 square foot Incubator building that accelerates the success of startup companies. Successful Incubator graduates include Appareo, Intelligent InSites, Pedigree Technologies and Myriad Mobile.

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 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 Graduate School

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

The Graduate School 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 an enrollment of more than 14,700 students in its undergraduate and graduate programs, and its research expenditures surpass \$150 million annually.

NDSU was named by the Carnegie Commission on Higher Education to the elite "Research University/Very High Research" category, which represents the 108 top-ranked private and public universities in the United States. NDSU is the first and only university in the state to achieve the designation, which includes such distinguished institutions as Brown University, Columbia University, Cornell University, Dartmouth College, Georgetown University, Harvard University, Massachusetts Institute of Technology, Northwestern University, Ohio State University, Princeton University, Stanford University,

Texas A&M University, University of Minnesota–Twin Cities, University of Nebraska–Lincoln, University of North Carolina at Chapel Hill, University of Notre Dame, University of Southern California, University of Wisconsin–Madison, Vanderbilt University and Yale University.

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.

Academic Programs

NDSU offers more than 100 undergraduate and approximately 135 graduate degree programs of study in nine 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 (p. 22) section of this bulletin or may be viewed online at www.ndsu.edu/majors.

The Faculty

As of Fall 2014, NDSU has 756 ranked faculty, lecturers, and program administrators, as well as 209 part-time 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.

- College of Agriculture, Food Systems and Natural Resources (p. 72)
- College of Arts, Humanities and Social Sciences (p. 147)
- College of Business (p. 261)
- College of Engineering (p. 293)
- College of Health Professions (p. 348)
- College of Human Development and Education (p. 369)
- College of Science and Mathematics (p. 458)

Divisions

- Division of Academic Affairs (<https://www.ndsu.edu/provost>)
- Division of Agricultural Affairs (<https://www.ndsu.edu/vpag>)
- Division of Equity, Diversity and Global Outreach (<https://www.ndsu.edu/vpedgo>)
- 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 Student Affairs (<https://www.ndsu.edu/vpsa>)
- Division of University Relations (<https://www.ndsu.edu/vpur>)

The Campus

The NDSU campus in Fargo includes more than 109 buildings on approximately 44 square blocks or 261 acres. The campus has expanded into downtown Fargo, and is a small city within itself. Statewide, NDSU is located on 18,488 acres of North Dakota land, which includes the main Agricultural Experiment Station in Fargo and eight research centers throughout the state.

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 200,000 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 distance-based education. Courses, locations, and delivery systems are planned in response to requests and identified needs.

Continuing Education activities fall into three main categories: on- and off-campus credit courses, non-credit activities, and learning opportunities mediated via technology. Admission to NDSU is required to enroll in Continuing Education courses, which are numbered 601 or above. Individuals interested in enrolling in degree eligible credit activities must complete application procedures through the Graduate School.

Tri-College University

Tri-College University is a consortium of five regional institutions of higher education: North Dakota State University, Concordia College, Minnesota State University Moorhead, Minnesota State Community and Technical College, and North Dakota State College of Science. Through the Tri-College course exchange, students can take courses on the other campuses without going through separate admissions procedures. Tuition is paid only to the home school. Guidelines are available in the general NDSU Bulletin and from the registrar. The scope of opportunities for students is expanded by the sharing and coordination of programs and services among the many academic departments within the five institutions.

State Board of Higher Education

Created by constitutional amendment in 1939, the State Board of Higher Education (<https://www.ndus.edu/board>) 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.

Accreditation

NDSU is accredited as an institution by the North Central Association of Colleges and Schools. Inquiries may be directed to the Higher Learning Commission (<https://www.ncahlc.org>), 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 Board for Engineering & Technology (ABET): Bachelor of Science in: Agricultural and Biosystems Engineering, Civil Engineering, Computer Engineering, Construction Engineering, Electrical Engineering, Industrial Engineering and Management, Manufacturing Engineering, Mechanical Engineering
- 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 Marriage and Family Therapy Education: Couple and Family Therapy Program (Master of Science)
- Commission on Accreditation for Respiratory Care: Respiratory Care (Bachelor of Science)
- Commission on Accreditation of Allied Health Education Programs: Exercise Science (Bachelor of 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)
- 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.

University Resources

- Alumni Association (<https://www.ndsualumni.com>)
- Centers and Institutes (https://www.ndsu.edu/research/research_related_units/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/annualecurityreport)
- Email Policy (<https://www.ndsu.edu/fileadmin/policy/609.pdf>)
- Equal Opportunity Policy (<https://www.ndsu.edu/fileadmin/policy/100.pdf>)
- Privacy of Student Records (<https://www.ndsu.edu/bisonconnection/ferpa>)
- Sexual Harassment 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>)

Student Resources

Diverse services and reinforcement programs are available to students at NDSU. The resources linked below are aimed at enhancing student life by assisting students in gaining the maximum benefit from their educational experiences.

- Academic Collegiate Enhancement (ACE) Tutoring (https://www.ndsu.edu/studentsuccess/about_ace)
- Air Force ROTC (<https://www.ndsu.edu/afrotc>)
- Army ROTC (<http://www.ndsuarmyrotc.com>)
- Athletics (<http://www.gobison.com>)
- Bison Connection (<https://www.ndsu.edu/bisonconnection>)
- Career Center (<https://www.ndsu.edu/career>)
- Center for Writers (<https://www.ndsu.edu/cfwriters>)
- Counseling Center (<https://www.ndsu.edu/counseling>)
- Dining Services (https://www.ndsu.edu/dining_services)
- Disability Services (<https://www.ndsu.edu/disabilityservices>)
- Distance and Continuing Education (<http://www.ndsu.edu/dce>)
- Financial Aid (Student Financial Services) (<https://www.ndsu.edu/bisonconnection/finaid>)
- Information Technology Services (ITS) (<https://www.ndsu.edu/its>)
- International Programs (<https://www.ndsu.edu/international>)
- Memorial Union (<https://www.ndsu.edu/mu>)
- Military & Veterans Services (<https://www.ndsu.edu/veterans>)
- Multicultural Student Services (<https://www.ndsu.edu/multicultural>)
- Native American Pharmacy Program (https://www.ndsu.edu/pharmacy/student_organizations/native_american_professional_programs_napp)
- NDSU Bookstore (<http://www.ndsubookstore.com>)
- NDSU Libraries (<http://www.ndsu.edu/library>)
- Residence Life (<https://www.ndsu.edu/reslife>)
- Student Activities (https://www.ndsu.edu/mu/what_is_in_the_mu/programs/student_activities_office)
- Student (<http://www.ndsu.edu/studentsuccess>) Success Programs (<https://www.ndsu.edu/studentsuccess>)
- Study Abroad (<https://www.ndsu.edu/international/studyabroad>)
- Tri-College University (<https://www.tri-college.org>)
- TRIO Programs (<https://www.ndsu.edu/trio>)
- Wallman Wellness Center (<https://www.ndsu.edu/wellness>)
- University Honors Program (<https://www.ndsu.edu/honors>)

The University Provost (<https://www.ndsu.edu/provost>) has established a procedure for students to file a formal grievance (https://www.ndsu.edu/provost/student_grievances) regarding the University's provision of educational and academic services claiming a violation of a University rule, policy, or established practice that affects a student's education.

A student may also file a written student complaint (https://www.ndsu.edu/vpsa/forms_and_guidelines) concerning a college or university issue alleging improper, unfair, or arbitrary treatment. Academic complaints may be submitted in writing/email to the Provost or the Vice President for Student Affairs (<https://www.ndsu.edu/vpsa>) for non-academic matters. The purpose of the procedure is to provide an orderly collection of information, address students' complaints in a timely manner by appropriate university personnel, and help students learn effective conflict resolution skills.

Be aware that the University has already established specific procedures for the following and student academic grievances would not include the following:

- University employment
- Disciplinary action under the Code of Student Life
- Grade disputes/appeals
- University admission decisions
- Billing and student accounts

Guidelines have been established to assist students in stating the problem and desired problem resolution and are available from either the Vice President for Student Affairs or the Dean of Student Life (https://www.ndsu.edu/student_life/studentlifepage) office. Students also may arrange a meeting with Student Rights and Responsibilities (https://www.ndsu.edu/student_rights) at any time during the process for advice and direction in resolving the problem.

The Student Life (https://www.ndsu.edu/student_life) office publishes the "Rights and Responsibilities of Community: A Code of Student Conduct (<https://www.ndsu.edu/fileadmin/policy/601.pdf>)." This document sets forth the expectations of student behavior at NDSU.

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- Agricultural and Biosystems Engineering (p. 296)
- Agricultural Communication (p. 158)
- Agricultural Economics (p. 83)
- Agricultural Education (p. 390)
- Agricultural Systems Management (p. 92)
- Animal Health Management (p. 96) (*certificate only*)
- Animal Science (p. 97)
- Anthropology (p. 235)
- Apparel, Retail Merchandising and Design (p. 373)
- Architecture (p. 151)
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- Art Education (p. 254)

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B

- Behavioral Statistics (p. 541)
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C

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- Community Development (p. 237) (*minor only*)
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- Computer Science and Physics (p. 492)
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E

- Earth Science Education (p. 398)
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- Elementary Education & Human Development and Family Science (p. 449) (*dual degree program*)
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F

- Family and Consumer Sciences Education (p. 403)
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- Fraud Investigation (p. 270) (*minor only*)
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I

- Industrial Engineering and Management (p. 325)
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- Logistics Management (p. 560) (*minor only*)

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S

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V

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W

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Admission

Admission information, requirements and application materials are available on the respective department web site:

- Undergraduate Admission (<https://www.ndsu.edu/admission>) (*domestic, international and permanent resident students*)
- Graduate Admission (https://www.ndsu.edu/gradschool/prospective_students) (*international and domestic graduate students*)

In addition to the standard admission requirements and processes, special application instructions and admission information applies to special populations of students as identified below.

Admission of Early-Entry Students

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.

To begin as an Early Entry student, submit the following:

1. *Application for Admission* (http://www.ndsu.edu/admission/admission_information/application)
2. A nonrefundable \$35 application fee
3. Official high school transcript
4. Early Entry permission form (obtained from the Office of Admission)

College courses may or may not substitute for courses required for high school graduation. North Dakota students must initiate the Dual Credit Enrollment Application with a high school counselor to count college credit toward graduation requirements.

Early Entry students pay regular tuition and fees.

To begin enrollment as an Early Entry student, contact the Office of Admission.

Admission of Non-Degree Seeking Students

Special status is reserved for non-degree seeking students who wish to enroll in a limited number of courses at NDSU. Students are permitted to register for up to 15 credits. Interested students must submit an *Application for Admission* (<https://www.ndsu.edu/admission/forms>) to the Office of Admission and pay the \$35 nonrefundable application fee. Official transcripts are required if coursework was attempted any time one year prior to application. To take additional courses or become degree-seeking, appropriate high school and/or college transcripts must be submitted to be considered for admission.

Non-degree seeking students 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/co requisite coursework. Such information is listed in the Course Catalog details on Campus Connection (<https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST>). 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 appropriate academic department.

Admission by Examination (GED)

NDSU will accept the General Education Development (GED) certificate in place of a high school diploma. North Dakota residents may take these tests by appointment at the NDSU Counseling Center or at high schools throughout the state. Others should consult with schools in their home state for details about testing centers.

Students testing after 2014 must present scores of 150 or higher on each of the four content areas. ACT/SAT scores are required if applicant is under 25 years of age. Students testing between 2002 and 2014 must present an overall average score of 450 with no subject score lower than 410. For students testing prior to 2002, an average of 45 and subject scores no lower than 40 are required.

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 the 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.

Readmission of a Previously Admitted Student (Returning)

Returning students (also called reactivating students) have previously attended NDSU and are returning after a leave of absence of at least one full term (exclusive of summer session) or are returning following an academic suspension. Returning undergraduate students must submit a *Reactivation/Petition for Readmission Form* (<https://www.ndsu.edu/registrar/forms/reactivation>) to the Office of Registration and Records (<https://www.ndsu.edu/registrar>) at least 30 days prior to the start of the expected term of return. Returning graduate students should contact the Graduate School (<https://www.ndsu.edu/gradschool>) for information on returning from a leave of absence.

Students who have enrolled in courses at other institutions since leaving NDSU must arrange for official transcripts to be sent to the Office of Registration and Records, NDSU Dept. 5210, P.O. Box 6050, Fargo, ND 58108-6050. Failure to list all colleges, universities, and schools attended while away from NDSU may result in denial of readmission, rescission of admission, dismissal, loss of credit(s), or other appropriate sanctions. Returning students must have a minimum cumulative GPA of 2.00 in all NDSU and transfer coursework to be readmitted.

NDSU reserves the right to refuse admission or re-enrollment or to place conditions on admission or re-enrollment of applicants and former students who NDSU determines represent a safety risk to NDSU students, employees or property. Undergraduate applicants have the right to appeal any decision to the Vice President for Student Affairs within seven calendar days of the date the notice was received. Graduate applicants may appeal any decision to the Dean of the Graduate School within the same time frame.

Student Financial Information

- Financial Aid (Student Financial Services) (<https://www.ndsu.edu/bisonconnection/finaid>)
- Refund of Tuition and Fees (<https://www.ndsu.edu/bisonconnection/accounts/refunds>)
- Residency and Tuition Reciprocity (<https://www.ndsu.edu/registrar/residency>)
- Tuition and Fees (<https://www.ndsu.edu/bisonconnection/accounts/tuition>)
- Veteran's Affairs Education Benefits (<https://www.ndsu.edu/veterans>)

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- Continued Probation (p.)
- Academic Suspension (p. 63)
- Suspension Appeals (p. 63)
- Suspended Students (p.)
- Readmission (p. 64)
- Academic Forgiveness (p.)

Academic Calendar

Academic Year

NDSU operates on a semester system consisting of two standard 15-week fall and spring semesters, plus a final examination week each semester. A 12-week summer session also is offered. Variable-length, short-session courses are available, and meet the same total contact (class) hours as in standard semesters. See definition of an academic credit (p. 34).

Mid-Term

The mid-term point of a standard semester is approximately 40 class days after the standard semester start. See Examinations and Grading for mid-term grade information.

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.

Final Examinations

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

Final examinations (<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.

Academic Credit

Definition of a Credit Hour

In accordance with federal guidelines, academic credit hours for a course are determined by the amount of work represented in intended learning outcomes.

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.
 - For laboratories, a minimum of 100 minutes per week for 15 weeks is equivalent to one credit.
 - One semester credit of field experience (courses numbered 196-496; 595-795) 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 Center (<https://www.ndsu.edu/career>).
 - For undergraduate research experiences a minimum of 360 minutes per week for 15 weeks is equivalent to 1 credit.
 - 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 Planning and Registration Preparation

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 College of University Studies (https://www.ndsu.edu/univ_studies). An adviser assists a student in selecting courses to ensure a well-balanced education and helps interpret university and college policies and requirements. However, students are fully responsible for their academic decisions including selecting courses, meeting course requisites, corequisites/prerequisites, and adhering to policies, procedures, and deadlines. Academic advising for course registration typically begins one week prior to the start of registration each semester. Students should see their adviser prior to registration. Students with adviser holds are required to meet with their advisers to have the hold lifted. Adviser assignments and holds may be viewed on Campus Connection.

At any time, students and their advisers may track their degree progress using the Academic Requirements Report (<https://www.ndsu.edu/registrar/advising/advisement>) (degree audit) feature on Campus Connection. This functionality is interactive and allows the student to plan for and register for upcoming semesters within the report. Instructions and information on how to access and utilize these reports are available to both students and advisers.

Advisers also assist students with campus referrals, career planning, and campus policies and procedures. NDSU delivers services to support student academics and meet special needs. Refer to Student Resources (<https://www.ndsu.edu/registrar/advising/students>) for additional services.

The Office of Registration and Records (<https://www.ndsu.edu/registrar>) serves as a support center for academic advising on campus. Each of the academic colleges on campus has a designated staff member in Registration and Records (<https://www.ndsu.edu/registrar/office/liaisons>) who serves as a liaison to support and facilitate academic advising activities and undergraduate student degree progress. Academic advising resources (<https://www.ndsu.edu/registrar/advising>) are available online.

Class Attendance

Per the NDSU Policy Manual, Section 333 (<https://www.ndsu.edu/fileadmin/policy/333.pdf>), the following applies:

1. General Philosophy

- a. Attendance in classes is expected. Only the course instructor can excuse a student from course responsibilities. (The term course includes class, laboratory, field trips, group exercises, or other credit-bearing activities.)
 - b. If class attendance is a component of the course grade, the course instructor must clearly communicate this to the class in writing in the syllabus.
2. Faculty Responsibility
- a. The course instructor must clearly inform students on the first day of class and in writing in the syllabus (1) of their policy regarding class absence (including if supporting documentation is required; and (2) policy for making up missed assignments. It is recognized that sometimes an assignment is impossible to make-up.
 - b. The course instructor must exercise a fair and consistent standard for resolving questions of missed assignments, the type, extent, manner, and time frame of the make-up assignments.
3. Student Responsibility
- a. Students are responsible for informing course instructors of absences. If absences are known (e.g., university sanctioned activity, such as student government, judging, clubs, athletic competition, fine arts performances), course instructors shall be informed with written notification as far in advance as possible (preferably a two-week notice). Where advance notification is not possible (e.g., illness, family emergency), students should contact their course instructor as soon as possible about the absence. Veterans and student service members with special circumstances or who are activated, to include State Active Duty, are encouraged to notify the instructor as soon as possible, provide Activation Orders if possible, and inform the NDSU Office of Military and Veterans Services (<https://www.ndsu.edu/veterans>) to facilitate a smooth exit from and successful re-entry to the University.
 - b. When a student misses class for any reason, the student is responsible for contacting the instructor to make arrangements to follow the course instructor's policy in making up any missed assignments, if permitted.

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.

Classification of Students

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.

Conditional graduate standing: One who holds a baccalaureate degree and shows potential for successful graduate study, but does not meet all requirements for admission or has not satisfactorily completed prerequisite coursework. A maximum of 12 credits may be completed while under conditional status. Students may, in consultation with their major adviser, request a change to full graduate standing after demonstration of specified capability in graduate studies.

Graduate non-degree standing: One who holds a baccalaureate degree from an institution of recognized standing may enroll as a non-degree student. 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. No more than 10 credits taken under non-degree status with a grade of 'B' or higher may be transferred to any official program of study at NDSU. Students who decide to pursue full graduate admission are expected to complete the full application process.

Eligibility for Participation in Co-Curricular Activities

Student participation in co-curricular activities at NDSU is encouraged as an important aspect of college life and is viewed as helping fulfill social and general education needs as well as developing leadership ability. Students who are on academic or conduct probation may participate as members in campus co-curricular activities unless higher standards are set by the specific campus organization.

Students in Leadership Positions

Students holding elected or appointed leadership positions must meet the following academic and good conduct eligibility standards:

1. Students in leadership positions must have attained and must maintain during the term of participation a minimal cumulative grade average of 2.0.
2. Students in leadership positions must be enrolled for and maintain a minimum of nine (9) semester credits during the term of participation and have successfully completed nine (9) credits from the most previous semester.
3. Students in leadership positions must be in good conduct standing with the Office of the Vice President for Student Affairs.

Additional information on the eligibility for participation in co-curricular activities can be found on the Student Life (https://www.ndsu.edu/student_life/policies_and_forms/eligibility_for_participation_in_co_curricular_activities) website.

Collaborative Student 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 degree seeking undergraduate students in good academic standing (GPA of 2.0 or higher) are allowed to enroll collaboratively.
3. The collaborative process allows NDSU to combine credit 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 campus tuition/fees for collaborative course(s). This additional amount is included in the student's accounts receivable balance at NDSU.
6. Not all scholarships/tuition waivers cover collaborative tuition and fees. Please check with your funding agency.
7. Students must be in good financial standing to be eligible for collaborative coursework 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. Drop/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 (<https://www.ndsu.edu/registrar>), 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.*
12. A student's last 30 credits of a degree program must be earned in residence at NDSU. Any student taking credits within the last 30 must submit an Appeal for Exception to Academic Regulations (<https://www.ndsu.edu/registrar/forms/acadappeal>) to the Office of Registration and Records. Exempt from this requirement are students in the Elementary Education, Social Work, and Bismarck Nursing programs.
13. 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). However, if the request(s) cannot be processed, the student will be notified via their NDSU e-mail address.
14. 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.
15. Due to federal compliance, course repeats via collaborative registration will be prohibited to prevent significant federal financial aid impacts which could result in overpayment of federal financial aid funds.

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.

Credit by Examination

Students may demonstrate evidence of college-level achievement through the use of nationally standardized tests. Competency to write 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 repeat by proficiency testing a course that has been previously taken or failed at NDSU or another 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 considered NDSU residential credit.

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 111L	4	S/L & S/L
Biology	4-5	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	4-5	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	
Comparative Government & Politics	3	POLS 225	3	
Computer Science A	3	CSCI 160	4	S
Computer Science AB	3	CSCI 160 & CSCI 161	8	S & S
English Language & Composition	3	ENGL 110 (or ENGL 112)	3	C
English Literature & Composition	3	ENGL 220	3	A
English Literature & Composition	4-5	ENGL 110 & ENGL 220	6	C & A
Environmental Science	3	BIOL 124 & BIOL 124L	4	S/G & S/L
European History	3	HIST 101 & HIST 102	6	A & A
French Language	3	FREN 101 & FREN 102	8	A/G & A/G
German Language	3	GERM 101 & GERM 102	8	A/G & A/G
Human Geography	3	GEOG 151	3	B/G
Italian Language & Culture	3	Free Elective (TRSNFR 1XX)*	3	
Japanese Language & Culture	3	Free Elective (TRANSFR 1XX)*	3	
Latin	3	Free Elective (TRANSFR 1XX)*	3	
Latin Literature	3	CLAS 101 & CLAS 102	8	A & 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	3	Free Elective (PHYS 1XX)*	4	S/L
Physics I	4	PHYS 211 & PHYS 211L	4	S/L & S/L
Physics II	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	4	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	4	S/L & S/L
Psychology	3	PSYC 111	3	B
Spanish Language	3	SPAN 101 & SPAN 102	8	A/G & A/G
Spanish Literature & Culture	3	Free Elective (SPAN 1XX)*	3	
Statistics	3	Free Elective (STAT 1XX)*	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/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 Registration and Fees

NDSU is a national testing center for students wishing to take CLEP examinations. CLEP examinations are computerized and administered as needed. To register for a CLEP examination, contact the NDSU Counseling Center (<https://www.ndsu.edu/counseling>), 212 Ceres Hall (<https://www.ndsu.edu/alphaindex/buildings/Building::240>), 231-7671. The current fee for each of the Subject Examinations is \$105. 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 318	6	A & A
Analyzing & Interpreting Literature	50	ENGL 271 & 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 315 & ENGL 316	6	A & A
Financial Accounting	50	ACCT 200	3	
French Language Level I	50	FREN 101	4	A/G
French Language Level II	59	FREN 101 & FREN 102	8	A/G & A/G
German Language Level I	50	GERM 101	4	A/G
German Language Level II	60	GERM 101 & GERM 102	8	A/G & A/G
Human Growth & Development	50	PSYC 250	3	B
Humanities	50	Free Elective (HUM 1XX)*	3	
Information Systems & Computer Applications	50	Free Elective (CSCI 1XX)*	2	S
Introduction to Educational Psychology	50	Free Elective (TRANSFR 1XX)*	3	B
Introduction to Business Law	50	Free Elective (TRANSFR 1XX)*	3	
Introduction to Psychology	50	PSYC 111	3	B
Introduction to Sociology	50	SOC 110	3	B
Natural Sciences	50	Free Elective (TRANSFR 1XX)*	3	
Pre-Calculus	50	MATH 107	3	R
Principles of Macroeconomics	50	ECON 202	3	B/G
Principles of Management	50	Free Elective (TRANSFR 1XX)*	3	
Principles of Marketing	50	Free Elective (TRANSFR 1XX)*	3	
Principles of Microeconomics	50	ECON 201	3	B/G
Social Sciences & History	50	Free Elective (TRANSFR 1XX)*	3	
Spanish Language Level I	50	SPAN 101	4	A/G
Spanish Language Level II	63	SPAN 101 & SPAN 102	8	A/G & A/G
U.S. History I: Colonization to 1877	50	HIST 103	3	A
U.S. History II: 1865 to Present	50	HIST 104	3	A
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
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* 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/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.

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, free elective credit may be awarded. Credit earned through DSST may not be used to satisfy residence-credit requirements 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)*	3.00	
Art of the Western World	48	ART 111	3	A
Astronomy	48	PHYS 110	3	S
Business Law	44	Free Elective (TRANSFR 1XX)*	3	
Business Mathematics	400	Free Elective (TRANSFR 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 (TRANSFR 1XX)*	3	
Ethics in America	400	PHIL 210	3	
Foundations of Education	46	Free Elective (TRANSFR 1XX)*	3	
Fundamentals of College Algebra	400	MATH 103	3	

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	GEOL 105	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/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 Chemistry	4	CHEM 121, CHEM 121L, CHEM 122, CHEM 122L	8	S/L, S/L, S/L, S/L
HL English	4	ENGL 220	3	A
HL French B	5	FREN 101, FREN 102, FREN 201	11	A/G, A/G, A/D
HL Geography	4	GEOG 161	3	G
HL German B	5	GERM 101, GERM 102, GERM 201	11	A/G, A/G, A/D
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	COMM 312	3	
HL Mathematics	4	MATH 103, MATH 105	6	
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/G, 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/gened>) for more information on core NDSU courses.

To order official transcripts, please contact:

Web site: www.ibo.org/iba/transcripts (<http://www.ibo.org/iba/transcripts>)

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/bisonconnection/accounts>), 302 Ceres Hall (<https://www.ndsu.edu/alphaindex/buildings/Building::240>), 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 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: 127 PLTW EDD: Engineering Design and Development
- 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, please visit NDSU's College of Engineering K-12 Outreach (https://www.ndsu.edu/coe/k_12_outreach/project_lead_the_way_pltw) website or by contacting Holly Erickson, STEM Outreach Coordinator at (701) 231-7697 or by email at holly.erickson@ndsu.edu.

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

Degree and Graduation Information

Degrees Awarded at NDSU

A degree is the title of the credential that the university confers on a graduate who has completed 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. 45) and/or requirements as specified by their academic college on the program curriculum guide (<https://www.ndsu.edu/registrar/curricula>).

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 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.)
- 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.Trng.)
- 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 Music (M.M.)
- Master of Managerial Logistics (M.M.L.)
- Master of Natural Resources Management (M.N.R.M.)
- Master of Public Health (M.P.H.)
- Master of Science (M.S.)
- Master of Software Engineering (M.S.E.)
- Master of Transportation & Urban Systems (M.T.U.S.)
- Doctor of Musical Arts (D.M.A.)
- Doctor of Nursing Practice (D.N.P.)
- Doctor of Pharmacy (Pharm.D.)
- Doctor of Philosophy (Ph.D.)

Baccalaureate Degrees

To receive a baccalaureate degree from NDSU, students must complete all of the requirements listed in this section as well as those specified for the particular degree program by a college within the university. Students should consult the curriculum guide (<https://www.ndsu.edu/registrar/curricula>) or contact the academic department for further information on degree requirements. Degree candidates must satisfactorily complete one of the degree curricula offered at NDSU. Because curricula are subject to change annually, students are responsible for determining curricular expectations according to the following guidelines:

Intended majors and degrees, as well as second majors and minors, must be declared to become official by providing notice to the Office of Registration and Records (<https://www.ndsu.edu/registrar>), 110 Ceres Hall. Students follow the published curricula for the major program of study declared with the university from the semester/year of entrance at NDSU, from the point a new major is declared, or from the year of admission to a limited- or selective-enrollment program, whichever applies, to graduation provided enrollment at NDSU has not been discontinued for more than one year.

Students who advance in limited- or selective-enrollment programs will have their academic program/plan status changed accordingly by the appropriate academic department.

Any student who discontinues enrollment at NDSU for more than one calendar year is subject to meeting the curricular requirements in effect at the time of re-entry.

Majors and Minors

Majors and minors are integral parts of baccalaureate degree curricula. Specific curriculum requirements for majors may be acquired from the appropriate departmental office or from Registration and Records. Students are responsible for following the requirements in place at the time a major or minor is officially declared with the university.

Major: A major is a planned grouping of related courses that totals a minimum of 32 credits.

Minor: A minor is a similar grouping of courses that totals a minimum of 16 credits. A minimum of eight credits must be earned in residence at NDSU.

Second or Multiple Majors: A second (or multiple) major may be earned by completing the requirements of both (or all) majors offered under the same baccalaureate degree. At least 15 unique credits must exist between the majors. When requirements for multiple majors are met concurrently, all majors are displayed on the diploma.

Multiple majors or minors may be completed and recorded on the student's academic record after the degree for the first major has been awarded. When majors under different degrees are involved, the requirements for a second degree apply (See Second Degree (p. 45)).

Certificates

A certificate program is a specialized course of study requiring at least 16 credit hours at the undergraduate level or eight credit hours at the graduate level. 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 School (<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 School, 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.

Second Degree

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

1. All curriculum requirements are satisfactorily completed.
2. A 30-credit minimum is earned in residence beyond all of the credits and degree requirements for the first baccalaureate degree. All requirements for both degrees must be met, including the separate residency requirements at NDSU for each (36 for the first; 30 for the second). Any repeated courses do not count toward the 30 credits.
3. Each baccalaureate degree must be different. However, students may complete requirements for more than one major within a given degree, if available (see second /multiple majors).

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 (<https://www.ndsu.edu/registrar/creditexams/clep>) 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 (<https://www.ndsu.edu/registrar/creditexams/ap>) 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.

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, which includes the overall University requirements (includes general education), any college or department requirements if applicable, and major program of study requirements. Students may request substitutions or waivers for college or departmental requirements when extenuating circumstances prevail. Depending on the nature of the requested exception, departmental or college level approval is required.

Degree Audits

Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records (<https://www.ndsu.edu/registrar>). Degree candidates are certified by the Office of Registration and Records according to total credits earned, institutional grade-point average, and other university requirements.

A degree audit is an official review of graduation requirements to determine a student's graduation eligibility. Undergraduate students who have completed a minimum of 75 credits are notified and asked to complete the degree audit request (<https://www.ndsu.edu/registrar/forms/degreeaudit>). Degree audits are not automatically completed as student educational and degree goals vary (multiple degree, majors, minors, etc.). An official degree audit typically is completed by the Office of Registration and Records (<https://www.ndsu.edu/registrar>) two semesters prior to the student's reported graduation on the audit request.

At any time, however, students and their advisers may track degree progress at any time during a student's undergraduate career using the Academic Advisement Report (<https://www.ndsu.edu/registrar/advising/advisement>) (automated degree audit) feature on Campus Connection. This functionality is interactive and also allows the student to plan for and register for upcoming semesters within the advisement report. Instructions and information on how to access and read an Academic Advisement Report are available to students (<https://www.ndsu.edu/registrar/cchelp/advisement>) and advisers (<https://www.ndsu.edu/registrar/advising/advisement>).

Degree and Graduation Requirements

To receive a baccalaureate degree from NDSU, students must satisfactorily complete two sets of requirements: a) university-wide requirements and b) college- or department-level requirements, which include curricular requirements for completing majors and minors. College- and department-level

requirements for majors and minors are listed in the college sections (p. 70) of this bulletin under the appropriate college listing, and in curriculum guides (<https://www.ndsu.edu/registrar/curricula>) available online and in academic departments. Minimum degree/graduation requirements are as follows:

1. **Academic major requirements:** Satisfactory completion of all requirements of the curriculum in which one is enrolled. Earn a minimum total of 122 credits in approved coursework. Requirements for some academic majors exceed this minimum.
 - a. Because curricula are subject to change, intended degrees and majors, as well as second majors and minors, must be declared to be official. This may be done at the point of admission or readmission to the University or by submission of a Major Change form (<https://www.ndsu.edu/registrar/forms/majorchange>) to the Office of Registration and Records (<https://www.ndsu.edu/registrar>).
 - b. Students follow the published curricula in place when a major is declared or from the year of admission to a limited- or selective-enrollment program, whichever applies, to graduation provided enrollment at NDSU has not been discontinued for more than one calendar year.
 - c. Students who advance into limited- or selective-enrollment programs will have their academic degree/plan status changed accordingly based on information provided to Registration and Records by the respective academic department.
 - d. Students who discontinue enrollment at NDSU for more than one calendar year are subject to meet the curricular requirements in effect during the term of readmission.
 - e. Each program of study presented by a candidate for the baccalaureate degree is audited for meeting the degree requirements by the Office of Registration and Records. Degree candidates are certified according to total credits and grades earned and other university and degree program requirements.
2. **Total degree credits:** Earn a minimum total of 122 credits in approved coursework. Requirements for some academic programs exceed this minimum.
3. **General education requirements:** Satisfactory completion of the general education requirements as specified by the University and in a student's degree and major.
4. **Scholastic standing requirement:** A minimum institutional grade-point average of 2.00 based on work taken at NDSU for which grades have been assigned is required for graduation. When a course is taken and repeated at NDSU, only the last grade and credits earned will be used in computing the cumulative grade-point average. Some academic programs require higher minimum grade-point requirements.
5. **Upper-level credit requirements:** At least 37 of the credits presented for graduation must be in courses taken at the 300 and 400 level.
6. **Transfer Students:** Students with transfer credit from another institution must earn a minimum of 60 semester credits from a baccalaureate-degree granting or professional institution. Of these, at least 36 must be NDSU residence credits as defined below. Within these 36 resident credits, minimum requirements include 15 semester credits in courses numbered 300 or above (37 upper-level credits must still be earned in total) and 15 semester credits in the major field of study.
7. **Residence requirements:** Residence credits include credits registered and paid for at NDSU. These may include courses offered on the NDSU campus, via Tri-College (p. 69), or via NDSU distance education (<http://www.ndsu.edu/dce>). At least 36 credits must be NDSU resident credits and ordinarily, the last 30 credits must be earned in residence.

Exceptions to the Last 30 Credits Requirements:

 - a. Courses taken as part of a NDSU-sponsored study abroad or exchange program count as residence credit. Students must still fulfill all other graduation requirements.
 - b. Students admitted to an accredited non-baccalaureate professional degree program (eg., Veterinary Medicine, Chiropractic, etc.) at another institution prior to earning their baccalaureate degree from NDSU may be eligible to subsequently earn an NDSU bachelor's degree through the transfer of earned professional course credits. Professional coursework transferred back to fulfill major requirements must be either department-approved as equivalent to NDSU coursework or be authorized via department-approved substitution form. To be considered for this waiver, students must complete and submit an Appeal for Exception to Academic Regulations Form (<https://www.ndsu.edu/registrar/forms/acadappeal>) to the Office of Registration and Records during their last semester of enrollment at NDSU. Students must still fulfill all other graduation requirements.
 - c. Courses taken as a part of a required curriculum in an NDSU-approved dual degree or joint program with another institution (i.e., HDFS/Elementary Education with VCSU).
 - d. Excluding the above exceptions, students who need to complete a limited number of credits (typically not to exceed nine) to fulfill their graduation requirements, and who are unable to take them at or through NDSU may seek an exception by completing and submitting the Appeal for Exception to Academic Regulations Form (<https://www.ndsu.edu/registrar/forms/acadappeal>) to the Office of Registration prior to enrolling at another institution. To fulfill major requirements, transfer coursework must either be evaluated as equivalent to NDSU courses or be authorized via a department-approved substitution form. Students must still fulfill all other graduation requirements.
8. **Financial obligations:** Satisfy all financial obligations owed to the university.
9. **Application for degree:** All candidates for a baccalaureate or Pharmacy Doctorate degree must indicate their intent to graduate when registering for their last semester. The application form (<https://www.ndsu.edu/registrar/forms/degreeapp>) is available online. Failure to apply by the published graduation application deadline of the planned semester of graduation may delay the awarding of the degree until the following semester. If a student fails to complete the required courses by the intended graduation term, the student must reapply for graduation in a following term.

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

Degree Posting

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. Degrees are posted to the academic record approximately three weeks following the close of the semester in which degree requirements were successfully completed. Students must declare their intent to graduate, identifying all programs of study, with the Office of Registration and Records (<https://www.ndsu.edu/registrar>) or the Graduate School (<https://www.ndsu.edu/gradschool>).

Diplomas

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

Placement

In accordance with North Dakota University System Policy 402.1.2, (<http://www.ndus.nodak.edu/makers/procedures/sbhe/default.asp?PID=217&SID=5>) and North Dakota University System Procedure 402.1.2, (<http://www.ndus.nodak.edu/makers/procedures/ndus/default.asp?PID=458&SID=56>) students are placed into Mathematics 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.

The following criteria are used to determine placement of students who have been offered admission to NDSU into entry-level English courses.

- All students, whether from the United States, Canada or abroad, have the option to take the COMPASS English exam to determine placement or to attempt to place into a higher level English course.

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.
- 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. 5160; P.O. Box 6050; Fargo, ND 58108-6050; (701) 231-8463.
- Students who have not taken the ACT or SAT are eligible to enroll in a developmental English course, ASC 087, prior to enrolling in ENGL 110 with 100. ASC 087 will be delivered by North Dakota State College of Science (<http://www.ndscs.edu>) (NDSCS) on the NDSU campus. Students must register through the collaborative student registration (p. 36) process. Course textbooks for ASC 087 may be purchased through the NDSU bookstore (<http://www.ndsubookstore.com>).
- For students who have multiple exam scores, the highest placement may be used.
- Students who are required to begin in ASC 087 must successfully complete the course with a grade of 'S' (satisfactory) before they may enroll in ENGL 110 with 100, or equivalent.
- Students with an ACT sub-test score of 18 or higher (or SAT of 430 or higher) are advised to enroll in ENGL 120. Upon completion of ENGL 120 with a 'C' grade or higher, students will be awarded placement credit (3) for ENGL 110.
- Students with an ACCUPLACER WritePlacer score of 5 are advised to enroll in English 120.
- Students with a MELAB score should contact the IELP coordinator (http://www.ndsu.edu/modernlanguages/department_directory) for information on English placement.

The table below lists exam scores and corresponding course placement:

English ACT Sub-test Score	Writing SAT	COMPASS English Test Score	Course Placement
13 or lower	350 or lower	0-40	ASC: 087: College Writing Prep (NDSCS collaborative)
14-17	360-420	41-76	ENGL 110 with ENGL 100: College Composition I/ Corequisite Writing Lab
18 or higher	430	77-100	ENGL 120: College Composition II

English Placement for International Students

- All students are required to successfully earn credit for ENGL 112 and 122 (or 110 and 120 for native English speakers) or equivalent as part of the NDSU general education requirements.
- 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 with 100, or equivalent.
- For students who have multiple exam scores, the highest placement may be used.
- Students with qualifying exam scores are advised to enroll in ENGL 122. Upon completion of ENGL 122 with a 'C' grade or higher, students will be awarded placement credit (3) for ENGL 112.

The table below lists ACT and SAT exam scores and corresponding course Placement:

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112 With ENGL 100: ESL College Composition I	ENGL 122: ESL College Composition II
ACT English sub-test	13 or lower	14-17	18 or higher
SAT Writing	350 or lower	360-420	430

The table below lists placement exams for International students and corresponding course placement:

Exam Type	LANG 109: Language Use in Writing ESL II	ENGL 112 With ENGL 100: ESL College Composition I
IELTS (Overall)	5.5 or lower	6.0 or higher
TOEFL (Composite)	70 or lower	71 or higher
Pearson (Overall)	49 or lower	50 or higher
ELS Center	ELS 109 or lower	ELS 112 Certificate/Completion

NDSU Math Placement Procedures

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. The following guidelines apply to math placement practices:

- For students who have scores from multiple tests, 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. 5160; 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* a Math ACT sub-test score (or SAT score) must take the COMPASS test to determine course placement.
- Students from countries *other* than the United States and Canada who do not have prior college-level mathematics *OR* a Math ACT sub-test score (or SAT score) must take the COMPASS test *OR* the NDSU Math Placement Test to determine course placement.
- Students with a Math ACT sub-test score of at least 21 (or SAT 990) may elect to take the NDSU Math Placement Test to attempt to place into a course above MATH 103 or MATH 104.
- Students with a Math ACT sub-test score of 20 or lower may elect to take the COMPASS test to attempt to place into a course above MATH 98.
- Students with a ACCUPLACER Elementary Algebra score of 116 may enroll into MATH 103.
- Students needing to take the COMPASS test may contact Testing Services (https://www.ndsu.edu/counseling/testing_services) in the NDSU Counseling Center for more information. Questions about the NDSU Math Placement Test can be directed to Bison Connection (<https://www.ndsu.edu/bisonconnection>).

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

Math ACT Sub-test Score	Composite SAT (Math + Critical Reading)	COMPASS Mathematics Test Score	Course Placement
20 or lower	Lower than 990	Algebra < 49	MATH 98
21 or higher	990 or higher	Algebra \geq 49 or College Algebra \leq 49 or Trigonometry \leq 39	MATH 103 or MATH 104
-	-	College Algebra 30-49 and Trigonometry 30-59	MATH 107
-	-	College Algebra \geq 50	MATH 105 or MATH 146 or MATH 144*
-	-	College Algebra \geq 60 and Trigonometry \geq 60	MATH 165

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

Options for Students Who Placed into MATH 98:

Students who believe that their mathematical abilities exceed their placement into developmental MATH 98 may take the COMPASS test to demonstrate their ability. If a student does not have an ACT (or SAT) or prior college credit, they must either enroll in MATH 98 or take the COMPASS test for placement testing into a higher level mathematics course (students from countries *other* than the United States and Canada may also take the NDSU Math Placement Test). **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.**

NDSU Math Placement Test Option:

Students with a Math ACT sub-test score of at least 21 (or SAT 990) or students from countries other than the United States and Canada may take the NDSU Math Placement Test to determine if they are eligible for higher level placement. Students should consult the curriculum guide for their intended major(s) to determine the level of math courses required for that program. The table below lists possible NDSU Math Placement Test scores and corresponding course placement.

NDSU Math Placement Test Score	Course Placement
Algebra \leq 5	MATH 98
Algebra 6-9	MATH 103 or MATH 104
Algebra 8-9 and Pre-Calculus \geq 2	MATH 103 or MATH 104 or MATH 107
Algebra 10-12	MATH 105 or MATH 146 or MATH 144*
Algebra > 13 and Pre-Calculus = 0-3	MATH 105 or MATH 146 or MATH 144*
Algebra > 13 and Pre-Calculus 4-9	MATH 146 or MATH 144* or MATH 165 with co-requisite of MATH 105
Algebra > 13 and Pre-Calculus \geq 10	MATH 146 or MATH 144* or 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 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

General Education Program

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.

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.

NDSU Study Abroad and Study Tour Experiences

UNIV 492: Study Abroad – three study abroad credits, completed successfully and transferred back to NDSU, will qualify for either of the general education categories of Cultural Diversity or Global Perspectives. Six or more study abroad credits, completed successfully and transferred back to NDSU, will qualify for both Cultural Diversity and Global Perspectives categories.

(Prefix) 379: Study Tour – NDSU study tour instructors may apply for general education course approval in any category that pertains to the course content (including cultural diversity and global perspectives), especially but not only if the tour is offered with some regularity. Course approval for study tours requires a syllabus and a one-page rationale for how the tour addresses a general education outcome and should be sent to the Director of General Education for General Education committee review. Study tours must actively and substantially address the outcomes requested (comparable to an approved 3-credit course).

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.

Undergraduate Learning Outcomes

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

1. Communication - students will use a variety of modes, particularly written, oral, artistic, and visual to
 - a. effectively communicate analysis, knowledge, understanding, expression and/or conclusions
 - b. skillfully use high-quality, credible, relevant sources
 - c. demonstrate appropriate conventions in a variety of communication situations
 - d. demonstrate the ability to communicate effectively with diverse audiences in a variety of contexts
2. Critical Thinking, Creative Thinking, and Problem Solving - students will
 - a. explain the nature of evidence used for analysis
 - b. apply quantitative and qualitative methods to collect and analyze data
 - c. apply creativity and divergent thinking
 - d. evaluate the assumptions, evidence, and logic of competing views and explanations
 - e. identify methods of inquiry, approaches to knowledge, and their assumptions and limitations in multiple disciplines
 - f. evaluate, synthesize, and apply evidence to understand and address complex, real world problems
 - g. generate creative, reasoned, approaches or solutions to unscripted, real world problems
3. Technology - student will

- a. use technology to enhance understanding
 - b. identify the social, aesthetic, and ethical implications of technological decisions
 - c. analyze how technology evolves and shapes human experience
 - d. apply technology to demonstrate creativity and solve problems
 - e. demonstrate how technology augments our experiences and understandings
4. Natural and Physical Sciences - students will
- a. analyze components and dynamics of natural and physical worlds
 - b. develop models to explain phenomena within the natural and physical worlds
 - c. identify the role of scientific methods in the study of natural and physical worlds
5. Human Societies - students will
- a. identify the nature and impact of aesthetic and creative activities in human experience
 - b. analyze the interplay of self and society, particularly how social structures shape human experiences and how humans shape social structures
 - c. analyze the components and dynamics of human societies in their artistic, cultural, and historical contexts
 - d. apply theories or research methods to understand human events, identities, artifacts, or social structures
 - e. engage in a creative, aesthetic, or artistic activity
6. Diversity and Global Perspectives - students will
- a. identify how values and contributions of diverse societies provide contexts for individual experiences, values, ideas, artistic expressions, and identities
 - b. identify the role diversity plays in the ability of biological organisms to adapt to a changing environment
 - c. analyze how diversity contributes to and shapes solutions to challenges confronting the global community
 - d. evaluate how diverse systems (both natural and human-made), technologies, or innovations emerge from, interact with, and affect various communities
 - e. collaborate with others in diverse interpersonal, intercultural, or international settings
7. Personal and Social Responsibility - students will
- a. examine their own values, biases, and conclusions
 - b. analyze the ethical basis for and implications of personal, professional, and civic decisions
 - c. comprehend and demonstrate appropriate and healthy standards of personal and professional behavior
 - d. identify stewardship of the land and its people as integral to a land-grant university
 - e. analyze how personal choices impact communities and the world
 - f. engage in service learning

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. Department or college requirements for graduation may include general education courses that exceed the university minimum required for general education.
4. 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.
5. General education requirements can be met through the College Level Examination Program (CLEP) (p. 36), DSST (p. 36), International Baccalaureate (IB) (p. 36), departmental examinations, the Advanced Placement program (AP) (p. 36) of the College Entrance Examination Board, or equivalents.
6. 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.
7. No general education course may be taken for graduate credit.
8. 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.
9. The general education minimum requirements apply to all baccalaureate degree programs.
10. 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. Transfer students meet NDSU's general education "College Composition I and/or College Composition II" requirement in the lower-division Communication category if they have credit in any English course (in composition, composition and

literature, or the equivalent) totaling at least 2.67 semester credits per course. The total for all general education categories must be at least 39/40 semester credits for new students.

11. 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.
12. A student who has completed a general education program in the United States or Canada consisting of a minimum of 36 semester credits 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. [NOTE: Undergraduate curriculum guides identify courses in the general education section of the guide that typically satisfy both general education and major requirements. These courses must still be satisfied as part of the major requirement and cannot be waived by general education policy #12.]
13. 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.
14. 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/gened/syllabi>))
15. Effective spring semester 2015, 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.

General Education Courses

A dynamic list of approved general education courses by term is always available on the General Education Requirements website (<https://www.ndsu.edu/registrar/gened>).

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 39-40 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.

First Year Experience Course (F) 1 credit*

ABEN 189	Skills for Academic Success	1
AGRI 189	Skills for Academic Success	1
BUSN 189	Skills for Academic Success	1
HD&E 189	Skills for Academic Success	1
ME 189	Skills for Academic Success	1
NURS 189	Skills for Academic Success	1
PHRM 189	Skills for Academic Success	1
UNIV 189	Skills For Academic Success	1
ENGR 291	Seminar	3

*First year experience may be exempt if student is transferring in 24+ credits.

Category 1: Communications (C) 12 credits

Nine Credits must be in Writing, three at the Upper-Level*:

ENGL 110	College Composition I	3
or ENGL 112	ESL College Composition I	
ENGL 120	College Composition II	3-4
or ENGL 121	Honors Composition II	
or ENGL 122	ESL College Composition II	
COMM 110	Fundamentals of Public Speaking	3
or COMM 111	Honors Public Speaking	
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 322	Writing and the Creative Process	3
ENGL 323	Creative Writing	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
SPAN 401	Advanced Spanish Grammar and Writing	3

Category 2: Quantitative Reasoning (R) 3 credits

CSCI 122	Visual BASIC	3
CSCI 125	Beginning COBOL	3
CSCI 159	Computer Science Problem Solving	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

Known Quantitative Reasoning Equivalencies*:

MATH 144	Mathematics for Business	4
MATH 147	Applied Calculus II	4
MATH 166	Calculus II	4

*Any 200-level course or higher

*General education requirements can be met by successful completion of an advanced course in the same department with comparable course content to a lower division general education course.

CATEGORY 3: Science & Technology (S) — 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):

BIOL 111	Concepts of Biology	3
BIOL 111L	Concepts of Biology Lab	1
BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
BIOL/ZOO 126	Human Biology	3
BIOL/ZOO 126L	Human Biology Laboratory	1
BIOL 220	Human Anatomy and Physiology I	3
BIOL 220L	Human Anatomy and Physiology I Laboratory	1
BIOL/BOT/PLSC/ZOO 315	Genetics	3
BIOL/BOT/PLSC/ZOO 315L	Genetics Laboratory	1
ENT 210	Insects, Humans and the Environment	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

Physical Science (Sp):

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	Eastern North Dakota Field Course <small>May be taken as a co-requisite lab if taken with GEOL 105 or GEOL 106.</small>	1
HNES 250	Nutrition Science <small>May be used for Category 5b: Wellness if taken in addition to the 10 credits required in Science & Technology. It may not be counted in more than one category.</small>	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
PHYS 220	Physics for Designers	3
UNIV 150	Foundations of Science	3
UNIV 151	Science and Society	3

Known Physical Science Equivalencies*:

CHEM 150	Principles of Chemistry I	3
CHEM 151	Principles of Chemistry II	3
CHEM 160	Principles of Chemistry Laboratory I	1
CHEM 161	Principles of Chemistry Laboratory II	1
PHYS 251	University Physics I	4
PHYS 251L	University Physics I Laboratory	1
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1

*General education requirements can be met by successful completion of an advanced course in the same department with comparable course content to a lower division general education course.

Technology (St):

CSCI 114	Microcomputer Packages	3
or CSCI 116	Business Use of Computers	

CATEGORY 4: Humanities & Fine Arts (A) — 6 Credits

- No more than 3 of the 6 credits may be in fine arts performance.

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
ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARB 201	Second-Year Arabic I	3
ARCH 321	History and Theory of Architecture I	3
ARCH 322	History of Architecture II	3
ART 110	Introduction to the Visual Arts	3
ART 111	Introduction to Art History	3
ART 210	Art History I	3
ART 211	Art History II	3
CLAS 101	First-Year Latin I	4
CLAS 151	First-Year Greek I	4
ENGL 220	Introduction to Literature	3
ENGL 225	Introduction to Film	3
ENGL 231	The Bible as Literature	3
ENGL 315	British Literature I	3
ENGL 316	British Literature II	3
ENGL 317	American Literature I	3
ENGL 318	American Literature II	3
ENGL 330	British and American Women Writers	3
ENGL 335	Multicultural Writers	3
ENGL 336	Literature and The Environment	3
ENGL 340	19th Century American Fiction	3
ENGL 341	20th Century American Fiction	3
ENGL 345	Themes in American Culture	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 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 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 261	American Indian History	3
HIST 271	Introduction to Latin American History	3
HIST 381	Australia & New Zealand	3
HIST 431	The North American Plains	3
HON 340	Colloquium in the Humanities	3
HON 386	World Literature: Imaginary Homelands	3
LA 322	History of Landscape Architecture	4
MUSC 100	Music Appreciation	3
MUSC 103	Introduction to Music History	3
MUSC 108	Roots of American Popular Music	3
PHIL 101	Introduction to Philosophy	3
PHIL 111	Professional Responsibility and Ethics	3

PHIL 215	Contemporary Moral Issues	3
PHIL 216	Business Ethics	3
RELS 100	Introduction to Religion	3
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
SPAN 201	Second-Year Spanish I	3
THEA 110	Introduction to Theatre Arts	3
THEA 115	World Film	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

Fine Arts Performance:

- Any performance courses must be in addition to those required for the student's major.

ART 130	Drawing I	3
THEA 161	Acting I	3

CATEGORY 5a: Social & Behavioral Sciences (B) — 6 Credits

ADHM 486	Dress and Human Behavior	3
ANTH 111	Introduction to Anthropology	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
ENGR 312	Impact of Technology on Society	3
GEOG 151	Human Geography	3
GEOG 161	World Regional Geography	3
HDFS 135	Family Science	3
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
HDFS 475	Children and Families Across Cultures	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
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 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3

CATEGORY 5b: Social & Behavioral Sciences—Wellness (W) — 2 Credits

- At least two credits must be taken from the following list
- 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.

HDFS 182	Wellness and Aging	3
HDFS 242	Couples, Marriages and Families	3
HNES 100	Concepts of Fitness & Wellness	2
HNES 111	Wellness	3
HNES 200	Principles of Nutrition	3
HNES 217	Personal and Community Health	3
HNES 250	Nutrition Science	3

CATEGORY 6: Cultural Diversity (D)

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for cultural diversity.

ADHM 410	Dress in World Cultures	3
ADHM 411	Food and World Cultures	3
ANTH 111	Introduction to Anthropology	3
ARB 201	Second-Year Arabic I	3
ART 110	Introduction to the Visual Arts	3
COMM 216	Intercultural Communication	3
ENGL 330	British and American Women Writers	3
ENGL 335	Multicultural Writers	3
ENGL 340	19th Century American Fiction	3
ENGL 341	20th Century American Fiction	3
ENGL 345	Themes in American Culture	3
FREN 201	Second-Year French I	3
FREN 345	Women in French Literature	3
GERM 201	Second-Year German I	3
HDFS 475	Children and Families Across Cultures	3
HIST 135	Race in U.S. History	3
HIST 261	American Indian History	3
HIST 271	Introduction to Latin American History	3
HIST 431	The North American Plains	3
HON 386	World Literature: Imaginary Homelands	3
MUSC 108	Roots of American Popular Music	3
PHIL 215	Contemporary Moral Issues	3
SOC 235	Cultural Diversity	3
SOC 412	Sociology of Gender	3
SPAN 201	Second-Year Spanish I	3
THEA 115	World Film	3
THEA 280	World Theatre	3
WGS 110	Introduction to Women's Studies	3
WGS 112	Introduction to Masculinities	3

CATEGORY 7: Global Perspectives (G)

- This requirement may be met by 3 credits taken in any department as part of the 40 credits required for general education in a course approved for global perspectives.

ARB 101	First-Year Arabic I	4
ARB 102	First-Year Arabic II	4
ARCH 321	History and Theory of Architecture I	3
ART 111	Introduction to Art History	3

BIOL 124	Environmental Science	3
BIOL 124L	Environmental Science Laboratory	1
ECON 105	Elements of Economics	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ENGL 231	The Bible as Literature	3
ENGL 336	Literature and The Environment	3
ENGR 312	Impact of Technology on Society	3
FREN 101	First-Year French I	4
FREN 102	First-Year French II	4
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
GERM 101	First-Year German I	4
GERM 102	First-Year German II	4
GERM 220	German Culture & Society	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
SPAN 101	First-Year Spanish I	4
SPAN 102	First-Year Spanish II	4
UNIV 151	Science and Society	3

North Dakota University System General Education Requirements Transfer Agreement

The North Dakota University System (NDUS) General Education Requirements Transfer Agreement (GERTA (<https://www.ndus.edu/employees/articulation-transfer/gerta-guides-request-form>)) 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.

Project 65

People aged 65 or over may audit one course per semester free of tuition and related fees, with the exception of a one-time \$35 application fee. Courses not eligible for Project 65 include those offered through NDSU's Division of Distance and Continuing Education (<http://www.ndsu.edu/dce>).

Project 65 students are encouraged to purchase the textbooks for their courses. The transcript of a student auditing a course will show a grade of 'Audit' for the course, which will not count as credit toward a degree. By definition, an auditor may attend class only as a listener. Students wishing to earn credit toward a degree must be admitted and pay all tuition and fees and complete all assignments and tests.

Students are responsible for course identification and selection and need to obtain a class permit with the audit authorization from the department/instructor. Students should identify themselves as participants in the Project 65 program at the time of registration to the Office of Registration and Records (<https://www.ndsu.edu/registrar>), 110 Ceres (<https://www.ndsu.edu/alphaindex/buildings/Building::240>) (701-231-7981).

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. Dates and deadlines for advising and registration are made available in the Academic Dates and Deadlines Calendar (<https://www.ndsu.edu/registrar/dates/calendar>) posted online. Students are encouraged to visit with an academic adviser before registering for classes (*see Academic Advising* (p. 34)).

Schedule of Classes: The most current and complete listing of classes is made available on Campus Connection, NDSU's official student information system, approximately one month prior to the start of registration for a subsequent term. A course listing (<https://www.ndsu.edu/registrar/schedule>) is also available online.

Online Registration: Enrolled students may register online via Campus Connection (<https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST>), 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 and for those who are unable to or who choose not to register online.

- **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 three 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 may 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 registration appointment times according to total credits earned after the *Reactivation/Petition for Readmission* is received and processed in the Office of Registration and Records (<https://www.ndsu.edu/registrar>). 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/studentssuccess>). Incoming freshmen, including first year students with transfer credit, are expected to attend a new student orientation and registration session. 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.

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. However, students are responsible for all course registration activity and should drop courses that they do not intend to complete. They should not rely on instructors or departments administratively dropping them. Failure to drop courses by posted deadlines may result in failing grades and debt owed the university. Administrative course drop requests by departments are submitted to and processed by the Office of Registration and Records (<https://www.ndsu.edu/registrar>).

Financial Obligation Agreement

The North Dakota University System Financial Obligation Agreement (https://www.ndsu.edu/bisonconnection/accounts/financial_obligation_agreement_foa) (FOA) is a document 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.

Changes in Registration

Registration deadlines for standard fall and spring semester courses are posted in the online Dates and Deadlines calendar (<https://www.ndsu.edu/registrar/dates/calendar>). Deadlines for variable length and summer session courses are adjusted proportionately and are also available online. Students are responsible for making changes to their registration according to published procedures and deadlines.

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 Bison Connection (<https://www.ndsu.edu/bisonconnection>).

Enrollment Add Deadline

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, as well as approval by the Provost's Office. Contact the Office of Registration and Records for additional information (https://www.ndsu.edu/registrar/dates/course_add_deadline).

Dropping Courses/Sections

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 will be recorded on student transcripts with 'W'. These indicators do not affect grade-point averages, but are counted in attempted credits for financial aid satisfactory academic progress (<https://www.ndsu.edu/bisonconnection/finaid/sap>).

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 is one-half of the regular tuition rate, and may be included in the tuition cap.

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 options.

Cancellation of Registration

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 (<https://www.ndsu.edu/registrar/forms/cancel>). Forms must be submitted to Bison Connection (<https://www.ndsu.edu/bisonconnection>). Cancellations are not accepted by telephone, and it is not possible to cancel registration or to drop an only or last course online. Cancellations completed **prior to the semester start date** result in a full refund and no academic transcript.

Withdrawal to Zero Credits

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. Refer to the section on Financial Information (<http://www.ndsu.edu/bisonconnection/accounts/refunds/#c166637>) for prorated refund deadlines for withdrawals. Procedures 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>).
2. Contact the Counseling Center (<https://www.ndsu.edu/counseling>) or Disability Services (<https://www.ndsu.edu/disabilityservices>) if assistance is needed in addressing academic, personal, financial, or other concerns.
3. Withdrawal forms are to be submitted to Bison Connection (<https://www.ndsu.edu/bisonconnection>) in the Memorial Union (<https://www.ndsu.edu/mu>).
4. Students are responsible for any unpaid bills at the time of withdrawal.
5. Withdrawal forms must be submitted by the published deadline of the semester (<https://www.ndsu.edu/registrar/dates/calendar>). Withdrawals after this date will not be processed without evidence of a compelling reason or circumstances beyond the student's control. Courses already completed at the time of withdrawal from a term will be withdrawn as well.
6. Students should not attempt to drop all of their courses, their last course, or their only course online.

7. Unlike refunds for individual course drops, withdrawal refunds are prorated and are based on complete withdrawals from all courses, course lengths, and withdrawal dates.

Retroactive Withdrawals

Students seeking to withdraw after final grades have been posted may appeal for a retroactive withdrawal; selective course drops are not allowed. Appeals must include documented evidence of a circumstance beyond the student's control which prevented the student from withdrawing on or before the published deadline for the term. The formal appeal request must be submitted prior to three years after the term of the last date of attendance at NDSU.

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 (<https://www.ndsu.edu/gradschool>). 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 (<https://www.ndsu.edu/gradschool>). 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.

Scholastic Standards

Academic progress is measured by grades and credits earned. Students receive acknowledgment for high academic achievement and are given early warning when they become academically deficient.

Academic Honesty and Integrity

The primary responsibility of the students, faculty, and administration is to create an atmosphere where the honesty of individuals will not be questioned.

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

Instructors 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. In this situation, the student may not drop the course in question without the permission of the instructor.

Faculty has 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. In this situation, the student may not drop the course in question without the permission of the instructor.

Faculty members will report the incident to the department chair, dean, and registrar. In the case of the graduate students, the graduate dean also will be notified. 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

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 hours during the summer) in graded coursework. The Dean's List is only maintained for undergraduate students and professional (Pharm.D.) students.

Academic Standing

To be eligible to register continuously without conditions, an undergraduate or professional student must maintain good academic standing, which is defined as a minimum cumulative institutional grade point average of 2.00 (4.00 scale).

Some programs of study have academic standards higher than the University minimum. Students should consult with their adviser or academic department for program specific requirements.

Records of all students are examined at the end of each grading period. Academic standing relates to the following:

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. Students placed on academic probation may not enroll in more than 16 credits for the following semester (or 12 credits for the following summer session) without permission of the student's academic adviser. An academic probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. An adviser hold is placed on the student's record, and may only be removed after the student has met with his/her adviser. 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. Students placed on continued probation may enroll in no more than 16 credits for the following semester (or 12 credits for the following summer session) without permission of the student's academic adviser. Continued probation does not appear on the student's official academic transcript, but does appear on the unofficial transcript. An adviser hold is placed on the student's record, and may only be removed after the student has met with his/her adviser. Students are notified of their continued probation status via official NDSU email.

Academic Suspension

Academic suspension is issued when the academically deficient student does not demonstrate an improvement in his or her institutional cumulative GPA at the close of the semester. 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. Academic suspension is issued when a student who entered the grading period on either probation or continued probation 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.

Students who are suspended are notified of their suspension status via official NDSU email and letter sent to the 'Home' address as listed in Campus Connection.

Suspension Appeals

A student who has been suspended may appeal the suspension if there were extraordinary circumstances beyond their control and if supporting documentation is provided. An Appeal for Exception to Academic Suspension Form (<https://www.ndsu.edu/registrar/forms/suspappeal>) is available online and must be submitted to the Office of Registration and Records (<https://www.ndsu.edu/registrar>) no later than 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).

Suspended Students

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, with the exception of Tri-College courses (see Repeated Courses (p. 65) section for more details).

Readmission After Academic Suspension

To be considered for readmission after serving an academic suspension, students must sit out for a minimum of two grading periods (includes summer) and file a Reactivation/Petition for Readmission Form (<https://www.ndsu.edu/registrar/forms/reactivation>) to the Office of Registration and Records (<https://www.ndsu.edu/registrar>) 30 days prior to the beginning of the semester in which readmission is sought. The petition is reviewed by the College Student Progress committee within the academic college for the program of study being sought. If approved, the student may register, but will be readmitted on probation (cumulative GPA below 2.00). Students who enrolled in courses at another institution while being separated from NDSU 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 have earned a minimum cumulative GPA of 2.00.

Academic Forgiveness

A former NDSU student who has not completed a baccalaureate degree and has not been in attendance at NDSU for six (6) or more years, but who is presently enrolled 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 interval.

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 by submitting a written request to the Office of Registration and Records (<https://www.ndsu.edu/registrar>).

Student Credit Load

The recommended credit load for undergraduate students is 15-18 hours per semester during a standard academic semester (fall/spring). A minimum of 12 credits per semester is required to be considered a full-time undergraduate or professional student (9 credits in the summer).

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/overtwenty>) is available online.

Graduate students full time status is 9 credits (6 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.

Student Records

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	*

* Not calculated in grade-point average, but may be calculated in attempted credits for satisfactory academic progress (<http://www.ndsu.edu/bisonconnection/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 (p.) and Repeated Courses (p. 65).

Repeated Courses

Students who wish to take advantage of the repeated course opportunity to improve a grade must repeat the course at NDSU, with one exception only. NDSU students may register for a Tri-College course to repeat a course previously taken at NDSU (see Tri-College rules and restrictions (p. 69)). If a course is completed at NDSU and an attempt is made to repeat that course elsewhere, the credit is considered duplicate and is not eligible for transfer. When a course is repeated at NDSU, all attempts remain on the academic record but only the credits, grades, and related honor points for the most recent attempt will be used in calculating the cumulative grade-point average and credits for graduation. Students forfeit the previous grade no matter what grade is earned when the course is repeated.

All repeated courses are noted on the transcript to indicate the course was repeated in a following term and previous attempts are excluded from cumulative totals. In courses that are repeatable for credit (as noted in the catalog description), students must notify the Office of Registration and Records (<https://www.ndsu.edu/registrar>) if they intend to re-enroll for purposes of grade improvement.

Courses taken for regular 'A'-'F' grades may not be repeated under the pass-fail grading option.

The course repeat option to improve one's academic record is available to students who have not graduated. 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.

Transcripts

Official transcripts may be requested online through Campus Connection (<https://studentadmin.connectnd.us/psp/NDCSPRD/EMPLOYEE/HRMS/h/?tab=GUEST>) (current students) or through www.getmytranscript.com (<http://www.getmytranscript.com>) (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/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/bisonconnection/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 (p. 66) and Appeals (p.).

Pass-Fail Grading

Pass-fail grading is available in any given course; 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.
2. Approval for the pass/fail option must be filed in the Office of Registration and Records (<https://www.ndsu.edu/registrar>) by the published pass/fail deadline of the semester. Variable length and summer courses have prorated deadlines according to actual course length.
3. Once a pass/fail request has been approved and filed, it may not be changed back to a regular 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, instructors 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 reports shall be made available to students upon request. Mid-term grades are not considered official grades and do not appear on student academic transcripts. Adviser holds may be placed on students who have one or more reported deficient mid-term grades.

Final Grades

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

Course Failures

A failing (F) grade may not be removed by special examination (F) or transfer credit. When a failing grade has been assigned, credit for that course may be earned only by re-enrolling in it at NDSU, or via Tri-College, and completing it satisfactorily. As with all repeated courses, the original grade will remain on the academic record, but only the latest attempt will be computed in grade-point average calculations (see Repeated Courses (p. 65)).

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 a summer term. If deemed appropriate, the instructor may submit a change of grade to the Office of Registration and Records (<https://www.ndsu.edu/registrar>) 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, a student may pursue a grade appeal. The Board may be utilized only after the student has exhausted possible appeal routes within the college offering the course. A grade appeal is deemed formally initiated when the student presents the **Grade Appeal Form** 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 (<https://www.ndsu.edu/registrar>), except in courses designated as practicum, internship, individual study, field experience, or study abroad.
5. An **Incomplete Grade Reporting Form** detailing the work to be completed, expected completion date, and grading standard is to be signed and dated by both the instructor and the student. The form is to be submitted to the Office of Registration and Records (<https://www.ndsu.edu/registrar>) by the grade submission deadline for the semester in which the course was taken. It is advisable that the instructor, student and adviser retain copies of this form for their records.
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). 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** with the Office of Registration and Records (<https://www.ndsu.edu/registrar>).
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 (<https://www.ndsu.edu/registrar>).
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 seventh week of the next full semester 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'.
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 (<https://www.ndsu.edu/registrar>) 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>).

Summer Session

The 12-week summer session is designed to provide coursework within various time intervals. Classes typically are offered in either the full 12-week session, the standard four-week session begins in May, or the standard eight-week session that begins in June. There are many other short or variable length courses throughout the summer. While the time interval of the individual sessions is different than that of the standard semester, each course carries full credit because classes meet the same number of contact hours as in the standard 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. The summer session course offerings schedule (<https://www.ndsu.edu/registrar/schedule/summer>) is available online. For information on summer school, please call 231-8492 or 231-6133.

Fees and Housing

Student, Course, and Program Fees (<http://www.ndsu.edu/bisonconnection/accounts/tuition>) are available online. 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).

Undergraduate Admission Requirements

The course offerings of the summer school are open to all qualified students. Students may enroll as degree candidates by meeting general university requirements as described elsewhere in this bulletin or may enroll for summer classes in a non-degree status by submitting an Application for Admission (https://www.ndsu.edu/admission/admission_information/application) to the Office of Admission (<https://www.ndsu.edu/admission>), a \$35 non-refundable application fee, and official transcripts from their home institution (if coursework was attempted within one year prior to application). Students who previously attended NDSU, but who have had a leave of absence of at least one full semester (fall or spring) must submit a Reactivation Form (<https://www.ndsu.edu/registrar/forms/reactivation>), and supply any necessary documentation.

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.

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 by the Office of Admission (<https://www.ndsu.edu/admission>), or has completed the reactivation process with the Office of Registration and Records, if a returning NDSU student. The evaluation process takes 6-8 weeks on average.

Evaluation of Transfer Credit from U.S. Institutions

The Office of Registration and Records (<https://www.ndsu.edu/registrar>) 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 equivalency or application to programs of study, transfer courses must be accepted for university credit according to the following guidelines:

1. Credit by examination (p. 36) or College-level coursework from regionally accredited colleges or universities (or equivalent for international institutions) is eligible for acceptance in transfer.
2. 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 credit is considered duplication and is not eligible for transfer. (See also Repeated Courses (p. 65) 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. It may, however, fulfill prerequisite requirements, if applicable.
4. Credit will be evaluated not only as it appears on the transcript, but also on the basis by which the credit was initially awarded by the sending institution. Credit by examination, credit awarded via placement, or life experience credit awarded by another institution is not accepted in transfer.
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.
6. College-level credits that do not have course equivalents at NDSU will be accepted as free electives and may count only toward total credits. An academic department may determine whether these transfer electives may satisfy specific curricular requirements through a course substitution process. (See also General Education Administrative Policies (p. 52).)
7. NDSU requires that a minimum of 37 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 37-credit upper-division degree requirement.
8. Transferable courses with 'D' grades or above will be accepted by the university; however, many colleges and departments have higher standards to determine course applicability toward their respective majors and programs.
9. The name of transfer institutions and total credits accepted by NDSU will be indicated on the official NDSU transcript. Individual transfer courses are not detailed on the academic transcript, but are provided in an official transfer evaluation and academic advisement report (<https://www.ndsu.edu/registrar/progress/advisement>) after admission to the university.
10. Total transfer credits are converted to semester credits, if applicable.
11. Transfer grades are recorded but not computed in the institutional cumulative GPA. They are used only for purposes of admission to the University, admission to certain programs, and for some scholarships and financial aid.

Evaluation of International Transfer Credit

According to North Dakota University System policy effective January 2013, international transcripts must be submitted to an approved external evaluation service. Obtaining an evaluation is the sole responsibility of the student. Evaluations must be submitted according to the guidelines listed below. The guidelines for the evaluation of transfer credit listed for Domestic/US Institutions (p. 68) also apply to international transfer credit.

NDSU students participating in an approved study-abroad program are not required to submit transcripts from study abroad experiences to an evaluation service. International students transferring from a North Dakota State University partnership institution are exempt from submitting an external international evaluation.

- Students must submit official transcripts to one of the following approved evaluators: the American Association of Collegiate Registrars and Admission Officers (AACRAO) International Education Services (<http://ies.aacrao.org>), a member of the National Association of Credential Evaluation Services (NACES) (<http://www.naces.org/members.htm>), or a member of the Association of International Credential Evaluators (AICE) (<http://www.aice-eval.org>).
- 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. Currently World Education Services (WES) (<https://www.wes.org>) is the only organization that provides NDSU with the required, certified documentation.
- New transfer students who have completed coursework at an institution outside the United States must submit transcripts to an approved evaluation service for a **course by course** evaluation.
- New international students should send evaluations directly to the NDSU Office of International Programs (<https://www.ndsu.edu/international>).

- New domestic students or United States permanent resident students should send evaluations directly to the NDSU Office of Admission (<https://www.ndsu.edu/admission>).
- Students must submit course descriptions for all completed coursework directly from the international institution to the NDSU Office of Registration and Records (<https://www.ndsu.edu/registrar>).
- Effective January 2015, all international transfer English coursework from non-native English speaking countries will not be accepted. English Coursework will transfer as remedial credit, and will be listed as equivalent to ENGL DEV at NDSU.

Common Course Numbers

Institutions in the North Dakota University System have established common course numbers (CCN) (<https://www.ndus.edu/employees/articulation-transfer/courses-with-common-transferrable-content>) 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 upper-division requirements for graduation.

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 school 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.

Details continue to be finalized throughout summer 2015 for the TCU expansion agreement to include Minnesota State Community and Technical College (M State) and North Dakota State College of Science (NDSCS); contact home campus TCU registrar office for additional information.

Tuition and Fees

Tuition is paid to the home campus. Courses not eligible for Tri-College registration are those offered through NDSU's Division of Distance and Continuing Education, 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 catalogued 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/registration/tcu-guide.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. Concordia and MSUM business courses taken via Tri-College may not be applied to professional programs (majors and minors) in the College of Business at NDSU without special permission by the college.

Credits and Grades

Courses taken through TCU course exchange will appear on a student's home campus transcript within the term they were taken 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/registrar/forms/tricollege>). 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.

Registration

NDSU students register by submitting the Tri-College Registration Form (<https://www.ndsu.edu/registrar/forms/tricollege>) to the Office of Registration and Records (<https://www.ndsu.edu/registrar>), 110 Ceres Hall (<https://www.ndsu.edu/alphaindex/buildings/Building::240>).

Tri-College Minors

The Tri-College partners recognize minors earned through the TCU course exchange. Students receive recognition on their graduation transcripts 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. Students may apply for tuition reciprocity prior to transferring from their home state.

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 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 NDSU/MSUM academic year; it is not available during the summer. Bus schedules are available at the TCU office and at several locations on each campus.

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 Parking Lot C (<https://www.concordiacollege.edu/admission-aid/visit-campus/campus-map>).
- **MSUM:** TCU students can park in Lots P and K (<https://www.mnstate.edu/parking>). TCU faculty and staff may park in Lots P, K, and F (<https://www.mnstate.edu/parking>).
- **NDSU:** TCU students can park in T or R Lot (<https://www.ndsu.edu/parking>). TCU faculty and staff permits are valid for T-1 Lot (<https://www.ndsu.edu/parking>).

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.

Colleges

- College of Agriculture, Food Systems and Natural Resources (p. 70)
- College of Arts, Humanities and Social Sciences (p. 144)
- College of Business (p. 260)
- College of Engineering (p. 290)
- College of Health Professions (p. 346)
- College of Human Development and Education (p. 365)
- College of Science and Mathematics (p. 456)
- College of University Studies (p. 543)

College of Agriculture, Food Systems, & Natural Resources

Kenneth F. Grafton

Morrill Hall 315, 701-231-8790, 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. 365) section in this Bulletin under the College of Human Development and Education (p. 365) 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. See Interdisciplinary Programs (p. 548) section of this Bulletin for more information. A major in Agricultural and Biosystems Engineering is offered by the College of Engineering (p. 290). The College of Human Development and Education (p. 365) offers a major in Agricultural Education and the College of Arts, Humanities, and Social Sciences (p. 144) offers a major in Agricultural Communication. These majors rely on the expertise and resources from the College of Agriculture, Food Systems, and Natural Resources.

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.

Honor System

A student-elected honor system (<http://www.ag.ndsu.edu/academics/honor-system-1>) recognizes the ability of students to govern themselves. The honor system, in place since 1955, provides an enhanced learning environment. All students enrolled in programs and courses offered by the College of Agriculture, Food Systems, and Natural Resources are required to uphold the honor system.

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://www.ndsu.edu/career/internshipprogram>). 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 Programs (<https://www.ndsu.edu/international>).

Interdisciplinary Programs

The following program is a College of Agriculture, Food Systems, and Natural Resources program of study:

- General Agriculture (p. 77)

The following program is interdisciplinary and is integrated with more than one college/departments within the University:

- Great Plains Institute of Food Safety (p. 110) (Food Safety major and minor)
- School of Natural Resource Sciences (p. 561) (Natural Resources Management)

Faculty

- Aakre, Dwight, Farm Management Specialist, M.S., 1983, North Dakota State University
- Acevedo, Maricelis, Assistant Professor of Plant Pathology, Ph.D., 2007, University of Nebraska-Lincoln
- Akyuz, F. Adnan, Assistant Professor of Practice of Climatological Practices, Ph.D., 1994, University of Missouri-Columbia
- Anderson, Albin W., Emeritus Professor of Entomology, Ph.D., 1969, Iowa State University
- Anderson, Donald E., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1968, University of Minnesota
- Anderson, Ronald, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1971, Washington State University
- Backer, Leslie F., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1972, North Dakota State University
- Bajwa, Sreekala G., Professor of Agricultural and Biosystems Engineering; Department Chair, Ph.D., 2000, University of Illinois at Urbana-Champaign
- Baranko, Loren L., Lecturer; Department of Animal Sciences, M.S., 2014, North Dakota State University
- Barker, William T., Emeritus Professor of Range Science, Ph.D., 1968, University of Kansas
- Bauer, Marc L., Associate Professor of Animal Sciences, Ph.D., 1996, University of Kentucky
- Berg, Eric P., Professor of Animal Sciences; Associate Head, Ph.D., 1996, Purdue University
- Berg, Erika L., Associate Professor of Animal Sciences, Ph.D., 2006, University of Missouri
- Berg, Ivan E., Emeritus Professor of Veterinary and Microbiological Sciences, D.V.M., 1960, University of Minnesota
- Berg, Paul T., Emeritus Associate Professor of Animal Sciences, Ph.D., 1975, North Dakota State University
- Bergholz, Peter W., Assistant Professor of Veterinary and Microbiological Sciences, Ph.D., 2007, Michigan State University
- Bergholz, Teresa, Assistant Professor of Veterinary and Microbiological Sciences, Ph.D., 2007, Michigan State University
- Berglund, Duane R., Emeritus Professor of Plant Sciences, Ph.D., 1971, North Dakota State University
- Berry, Eugene S., Associate Professor of Veterinary and Microbiological Sciences, Ph.D., 1983, Northeastern University
- Berti, Marisol, Associate 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
- Boerboom, Chris M., Professor of Plant Sciences; NDSU Extension Service Director, Ph.D., 1989, University of Minnesota
- 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
- Bora, Ganesh C., Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2005, Kansas State University
- Brueggeman, Robert, Assistant Professor of Plant Pathology, Ph.D., 2009, Washington State University
- 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
- 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
- Carena, Marcelo J., Professor of Plant Sciences, Ph.D., 1999, Iowa State University

- 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, Ph.D., 2000, Iowa State University
- Caton, Joel S., Professor of Animal Sciences; Jordan A. Engberg Endowed Professorship, Ph.D., 1987, New Mexico State University
- Ceroll, Kari L., Lecturer; Department of Animal Sciences, B.S., 2007, North Dakota State University
- Chatterjee, Amitava, Assistant Professor of Soil Science, Ph.D., 2007, University of Wyoming
- Christenson, Lisa A., Assistant Professor of Practice of Animal Sciences, 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., Associate Professor of Soil Science, Ph.D., 1979, Iowa State University
- Cobia, David W., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1967, Purdue University
- Cross, Harold Z., Emeritus Professor of Plant Sciences, Ph.D., 1971, University of Missouri
- Crosswhite, Justin D., Lecturer; Department of Animal Sciences, M.S., 2012, University of Florida
- Dahlen, Carl R., Assistant 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., Associate Professor of Plant Sciences, Ph.D., 2001, North Dakota State University
- Daigh, Aaron, Assistant 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
- De Laporte, Aaron, Research Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2014, University of Guelph, Canada
- 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, Associate 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, Associate Professor of Plant Pathology, Ph.D., 1999, Iowa State University
- DeSutter, Thomas M., Associate 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 Veterinary and 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; Director of the Veterinary Diagnostic Laboratory, D.V.M., 1991, Iowa State University
- Ebert, Jessica, Senior Lecturer of Veterinary and Microbiological Sciences, M.S., 2001, North Dakota State University, M.A., 2004, New York University
- Eck, Tate, Lecturer of Equine Science; Department of Animal Sciences, B.S., 1996, North Dakota State University
- Elias, Elias M., University Distinguished Professor of Plant Sciences, Ph.D., 1987, North 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
- Fisher, Nathan A., Assistant Professor of Veterinary and Microbiological Sciences, Ph.D., 2006, University of Michigan
- Flaskerud, George, Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1970, Oklahoma State University
- Fortuna, Ann-Marie, Assistant Professor of Soil Science, Ph.D., 2001, Michigan State University
- 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
- Franzen, David W., Professor of Soil Science, Ph.D., 1993, University of Illinois
- Freeman, Thomas P., Emeritus Professor of Plant Pathology, Ph.D., 1968, Arizona State University
- Friskop, Andrew J., Assistant 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
- Funke, Berdell R., Emeritus Professor of Veterinary and Microbiological Sciences, Ph.D., 1964, Kansas State University
- Gibbs, Penelope S., Associate Professor of Veterinary and Microbiological Sciences, Ph.D., 2001, University of Georgia
- Giles, Joseph F., Emeritus Professor of Soil Science, Ph.D., 1974, Colorado State University
- Goos, R. Jay, Professor of Soil Science, Ph.D., 1980, Colorado State University
- Grafton, Kenneth F., Professor of Plant Sciences; Vice President for Agricultural Affairs; Dean of College of Agriculture; Food Systems and Natural Resources; Director of North Dakota Agricultural Experiment Station, Ph.D., 1980, University of Missouri
- Gramig, Greta G., Assistant Professor of Plant Sciences, Ph.D., 2006, University of Wisconsin-Madison

- Grazul-Bilska, Anna, Professor of Animal Sciences, Ph.D., 1983, University of Agriculture and Technology, Olstyn, Poland
- Grygiel, Carolyn E., Emeritus Professor of Practice of Range Science, Ph.D., 1983, Colorado State University
- Gudmestad, Neil C., University Distinguished Professor of Plant Pathology, Ph.D., 1982, North Dakota State University
- Gustad, Thomas R., Instructor of Veterinary and Microbiological Sciences, M.S., 1992, North Dakota State University
- Haggart, Janice J., Instructor of Veterinary and Microbiological Sciences, M.S., 1996, North Dakota State University
- Hall, Clifford, Associate Professor of Plant Sciences, Ph.D., 1996, University of Nebraska
- Hammer, Carolyn J., Associate Professor of Animal Sciences, D.V.M., 2002, Iowa State University, Ph.D., 2003, Iowa State University
- Hammond, James J., Professor of Plant Sciences, Ph.D., 1969, University of Nebraska
- Hanna, Lauren L.H., Assistant Professor of Animal Sciences, Ph.D., 2013, Texas A&M University
- Hargiss, Christina L., Assistant Professor of Natural Resources Management, Ph.D., 2009, North Dakota State University
- Harmon, Jason P., Assistant Professor of Entomology; Program Leader of Entomology, Ph.D., 2003, University of Minnesota
- Harris, Marion O., 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
- Haugse, Clayton N., Emeritus Professor of Animal Sciences, M.S., 1958, North Dakota State University
- Hearne, Robert R., Associate 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., 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, 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
- Hodur, Nancy, Research Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2010, North Dakota State University
- Hofman, Vernon L., Emeritus Professor of Agricultural and Biosystems Engineering, M.S., 1969, North Dakota State University
- Holland, Neal S., Emeritus Professor of Plant Sciences, M.S., 1960, North Dakota State University
- Hopkins, David G., Associate 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
- Hosford, Robert, Emeritus Professor of Plant Pathology, Ph.D., 1965, University of Arizona
- Hossio, Kassu Wamisho, Research Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2012, University of Nebraska-Lincoln
- 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
- Jackson, Jeremy, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2008, Washington University in St. Louis
- Jia, Xinhua, Associate 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, 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, Thomas, Extension Horticulture Specialist, Ph.D., 1988, Virginia Polytechnic Institute and State University
- Kandel, Herman J., Professor of Plant Sciences, Ph.D., 1995, North Dakota State University
- Khan, Mohamed, Associate Professor of Plant Pathology, Ph.D., 1998, Clemson University
- Knodel, Janet J., Associate 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; Department Head; Associate Vice President for Agricultural Affairs, Ph.D., 1997, University of Nebraska
- Larsen, Ryan, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2009, Texas A&M University
- LeBoldus, Jared, Assistant Professor of Plant Pathology, Ph.D., 2010, University of Alberta-Edmonton
- 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., Associate Professor of Plant Sciences, Ph.D., 2001, Iowa State University
- Li, Xuehui, Assistant 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, Assistant 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, Assistant 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., Professor of Plant Sciences; Associate Head, Ph.D., 1979, University of Wyoming
- Maan, Shivcharan S., Emeritus Professor of Plant Sciences, Ph.D., 1961, Kansas State University
- Maddock, Robert J., Associate Professor of Animal Sciences, Ph.D., 2000, Texas A&M University
- Maddock Carlin, Kasey R., Associate Professor of Animal Sciences, Ph.D., 2005, Iowa State University
- Manthey, Frank A., Professor of Plant Sciences, Ph.D., 1985, North Dakota State University
- Marais, G. Francois, Associate Professor of Plant Sciences, Ph.D., 1979, North Dakota State University
- Marchello, Martin J., Emeritus Professor of Animal Sciences, Ph.D., 1968, Virginia Polytechnic Institute and State University
- Markell, Samuel G., Associate Professor of Plant Pathology, Ph.D., 2007, University of Arkansas
- McClean, Phillip E., Professor of Plant Sciences, Ph.D., 1982, Colorado State University
- McDonald, Clarence E., Emeritus Professor of Cereal Science, Ph.D., 1957, Purdue University
- McDonald, Hugh J., Emeritus Professor of Agribusiness and Applied Economics, Ph.D., 1969, Ohio State University-Columbus
- McEvoy, John, Associate Professor of Veterinary and Microbiological Sciences, Ph.D., 2002, University of Ulster, Jordanstown Co., Antrim, Northern Ireland
- McGinnis, Esther E., Assistant Professor of Plant Sciences, Ph.D., 2013, University of Minnesota
- McGranahan, Devan, Assistant Professor of Range Science, Ph.D., 2011, Iowa State University
- McKee, Gregory, Associate Professor of Agribusiness and Applied Economics; Director of Quentin Burdick Center for Cooperatives, Ph.D., 2006, University of California-Davis
- 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
- McPhee, Kevin E., Professor of Plant Sciences, Ph.D., 1995, University of Idaho
- 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
- Mergoum, Mohamed, Professor of Plant Sciences, Ph.D., 1991, Colorado State University
- 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
- Miller, James D., Emeritus Adjunct Professor of Plant Pathology; USDA, Ph.D., 1971, North Dakota State University
- Moraghan, John T., Emeritus Professor of Soil Science, Ph.D., 1961, Iowa State University
- Myers, Deland, Professor of Plant Sciences, Ph.D., 1985, Iowa 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
- Newman, David J., Assistant Professor of Animal Sciences, Ph.D., 2009, North Dakota State University
- Nganje, William, Department Chair/Professor of Agribusiness and Applied Economics, Ph.D., 1998, University of Illinois
- Norland, Jack, Assistant Professor of Natural Resources Management, Ph.D., 2008, North Dakota State University
- Oliver, Rebekah E., Assistant 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, Associate Professor of Plant Sciences, Ph.D., 2006, North Dakota State University, Ph.D., 1992, University of Stellenbosch-South Africa
- Ostby, Stacey M., Lecturer and Co-Director of Veterinary Technology Program; Department of Animal Sciences, B.S., 2002, North Dakota State University
- Park, Chung S., Professor of Animal Sciences, Ph.D., 1975, Virginia Polytechnic Institute and State University
- Pasche, Julie, Assistant Professor of Plant Pathology, Ph.D., 2012, North Dakota State University
- Peters, Thomas, Assistant 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
- Pratt, George L., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1967, Oklahoma State University
- Prischmann-Voldseth, Deirdre A., Assistant Professor of Entomology, Ph.D., 2005, Washington State University
- Pruess, Birgit, Associate Professor of Veterinary and Microbiological Sciences, Ph.D., 1991, Institut für Physiologische Chemie, Ruhr-Universität, Bochum, Germany
- Pryor, Scott W., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2005, Cornell University
- Rahman, Mukhlesur, Assistant Professor of Plant Sciences, Ph.D., 2007, University of Manitoba
- Rahman, Shafiqur, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Manitoba
- Ramamoorthy, Sheela, Assistant Professor of Veterinary and Microbiological Sciences, Ph.D., 2006, Virginia Polytechnic Institute and State University
- Ransom, Joel K., Professor of Plant Sciences, Ph.D., 1982, University of Minnesota
- Rasmussen, Jack B., Professor of Plant Pathology; Department Chair, Ph.D., 1987, Michigan State University
- Rathge, Richard W., Emeritus Professor of Agribusiness and Applied Economics and Sociology, Ph.D., 1981, Michigan State University
- Redmer, Dale A., 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 L., Senior Lecturer of Veterinary and Microbiological Sciences, M.S., 2002, University of Minnesota
- Rider, David A., Professor of Entomology, Ph.D., 1988, Louisiana State University
- Ripplinger, David, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2012, North Dakota State University
- Roberts, David, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2009, Oklahoma State University
- Robinson, Andrew P., Assistant Professor of Plant Sciences, Ph.D., 2012, Purdue University
- Saxowsky, David M., Associate 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., Associate Professor of Animal Sciences, Ph.D., 1999, North Dakota State University
- Schrupp, Jordan L., Lecturer; Department of Animal Sciences, B.S., 2003, North Dakota State University
- Schuh, Jane, Associate Professor of Veterinary and Microbiological Sciences; Interim Dean College of Business; Interim Associate Director North Dakota Agriculture Experiment Station, Ph.D., 2000, North Dakota State University
- Schwarz, Paul B., Professor of Plant Sciences, Ph.D., 1987, North Dakota State University
- Secor, Gary A., Professor of Plant Pathology, Ph.D., 1978, University of California-Davis
- Sedivec, Kevin K., Professor of Range Sciences; Program Leader of Range Science, Ph.D., 1994, North Dakota State University
- Shaik, Saleem, Associate Professor of Agribusiness and Applied Economics, Ph.D., 1998, University of Nebraska-Lincoln
- 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, Associate Professor; Bert L. D'Appolonia Cereal Science and Technology of Wheat Endowed Professorship, Ph.D., 2006, Purdue University
- Slanger, William D., Professor of Animal Sciences; Director of Institutional Research and Analysis, Ph.D., 1975, Cornell University
- Sleeper, Bayard P., Emeritus Professor of Veterinary and Microbiological Sciences, Ph.D., 1951, University of California
- Smith, M. Herbert, Emeritus Professor of Veterinary and Microbiological Sciences, D.V.M., 1962, University of Minnesota, Ph.D., 1974, Iowa State University
- Smith, Ronald C., Emeritus Professor of Plant Sciences, Ph.D., 1973, The Ohio State University
- Solseng, Elton G., Instructor of Agricultural and Biosystems Engineering, M.S., 1980, North Dakota State University
- Sonsthagen, Teresa F., Senior Lecturer and Co-Director of Veterinary Technology Program; Department of Animal Sciences, B.S., 1992, North Dakota 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
- Statler, Glen D., Emeritus Professor of Plant Pathology, Ph.D., 1969, University of Wyoming
- 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

- Swanson, Kendall C., Associate Professor of Animal Sciences, Ph.D., 2000, University of Kentucky
- Swanson, Tara J., Lecturer of Equine Science; Department of Animal Sciences, M.S., 2014, North Dakota State University
- Swenson, Andrew, Farm & Family Resource Management Specialist, M.S., 1982, 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
- Venette, James R., Emeritus Professor of Plant Pathology, Ph.D., 1975, University of Minnesota
- Vonnahme, Kimberly A., Associate Professor of Animal Sciences, Ph.D., 2003, University of Wyoming
- Wachenheim, Cheryl, Professor of Agribusiness and Applied Economics, Ph.D., 1994, Michigan State University
- Wagner, Sarah A., Associate Professor of Animal Sciences, D.V.M., 1994, Michigan State University, Ph.D., 2003, Iowa State University
- Wahl, Thomas I., Professor of Agribusiness and Applied Economics, Ph.D., 1989, Iowa State University
- West, Todd P., Associate Professor of Plant Sciences, Ph.D., 2004, Southern Illinois University
- Whited, Dean A., Emeritus Professor of Plant Sciences, Ph.D., 1967, North Dakota State University
- Wick, Abbey Foster, Assistant Professor of Soil Science, Ph.D., 2007, University of Wyoming
- Wiesenborn, Dennis P., Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, Rice University
- Williams, M. Dale, Foundation Seedstocks Director, Ph.D., 1978, University of Arizona - Tucson
- Wilson, William W., University Distinguished Professor of Agribusiness and Applied Economics, Ph.D., 1980, University of Manitoba, Canada
- Wolf-Hall, Charlene, Professor of Veterinary and Microbiological Sciences; Associate Provost for Academic Affairs, Ph.D., 1995, University of Nebraska-Lincoln
- Yan, Guiping, Assistant Professor of Plant Pathology, Ph.D., 2006, Washington 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, Assistant Professor of Agribusiness and Applied Economics, Ph.D., 2011, University of Texas at Dallas
- Zhang, Qi, Assistant Professor of Plant Sciences, Ph.D., 2007, Kansas State University
- Zhong, Shaobin, Associate Professor of Plant Pathology, Ph.D., 2000, North Dakota State University
- Zollinger, Richard K., Professor of Plant Sciences, Ph.D., 1989, Michigan State University
- Zubriski, Joseph C., Emeritus Professor of Soil Science, Ph.D., 1951, University of Wisconsin
- Zuk, Alan J., Associate Professor of Plant Sciences, Ph.D., 2005, Kansas State University

General Agriculture

General Agriculture Major

The degree program in General Agriculture is designed to serve students who wish to pursue a college education in several broad areas of agriculture or who want to tailor a program to meet their specific career objectives. Traditionally, students interested in careers focusing on agricultural production follow the General Agriculture curriculum or pursue majors in Animal Science, Crop and Weed Science, Equine Science or Horticulture.

Students electing to graduate with a General Agriculture major must file a "plan of study" with the General Agriculture Coordinating Committee by the third week of the semester in which they will complete at least 75 credits. This plan of study must include a "statement of goals" or why a tailored degree is desired and an outline of courses to be taken to meet their stated career goals. Identification of the capstone course and any internship that the student plans to take should also be included in the plan of study.

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. A minimum of eight credits must be taken at NDSU. Students must earn a 2.00 minimum GPA in the courses used to satisfy the minor requirements.

Major Requirements

General Agriculture Major

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189

Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)

1

Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
One Course in Upper Level Writing. Select course from current general education list.		3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
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. Select from current general education list.		
CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
PLSC 315	Genetics	3
Select one of the following:		3
CHEM 117	Chemical Concepts and Applications	
CHEM 121	General Chemistry I	
BIOL 111	Concepts of Biology	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

Major Requirements

General Education Requirements		40
Major Requirements for General Agriculture		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
MATH 103	College Algebra (or higher level mathematics)	3
Required Discipline Courses for General Agriculture * †		
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 †		18
Degree Requirements: Minimum of 21 credits to reach 128		21
Total Credits		128

- * • 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)

- † • The student and adviser will complete a substitution form 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.

Major Notes

- A plan of study must be filed with the student's assigned academic adviser prior to the completion of 75 credits. See department for this process.
- This major will not be available for view in the Student Advisement/Requirement Report in Campus Connection.

Minor Requirements

General Agriculture Minor

Minor Requirements

Required Credits: 24

General Agriculture

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.

Department of Agribusiness and Applied Economics

www.ag.ndsu.edu/agecon/

The Department of Agribusiness and Applied Economics offers three majors: (1) Agribusiness, (2) Agricultural Economics, and (3) Economics, and two minors: (1) Agribusiness and (2) Economics. Each of these 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. microeconomic 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.

Agribusiness (p. 80)

Agricultural Economics (p. 83)

Economics (p. 86)

Logistics Management (p. 91)

Agribusiness

Agribusiness Major

The Agribusiness major allows students to focus their understanding of economics on the agribusiness sector. Students interested in careers in agribusiness have several options. Beginning in their sophomore year, students take courses in management, marketing and finance, all concentrating on the unique aspects of food and bio-systems economics. Specialization in upper division courses permits students to further concentrate based on their particular interest:

- **Management:** This option provides students with a broad background, preparing them for general career alternatives in agribusiness.
- **Finance:** This option prepares students for careers in agribusiness finance, agricultural lending, financial institution management, accounting, insurance, and investment.
- **Marketing:** This option prepares students for careers in agricultural marketing, sales, or food product marketing.

In the Agribusiness program, students are exposed to a range of methods useful in agribusiness decision-making. Agribusiness graduates will master problem-solving skills to face challenges likely to be 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 are assured that all NDSU Agribusiness graduates have gained this valuable work experience through the required internship.

Collaboration with the College of Business (p. 260) leads to the concurrent satisfaction of one of the minors offered by the College of Business. Students may select business courses for the minor that complement their agribusiness interests.

Agribusiness Minor

The Agribusiness minor exposes students to applications of fundamental business concepts in an agricultural or food systems setting. A minimum of eight credits must be completed at NDSU. The Agribusiness minor is open to all NDSU majors.

Major Requirements

Major: Agribusiness

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One course in Upper Level Writing. Select course from the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics (C or better required)	3
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Science & Technology (S):

CSCI 116	Business Use of Computers	4
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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. Select from current general education list.		6
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Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B):	
ECON 201 Principles of Microeconomics	3
ECON 202 Principles of Macroeconomics	3
Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G):	
ECON 201 Principles of Microeconomics	3
Total Credits	40

Major Requirements

General Education Requirements	40
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
ECON 341 Intermediate Microeconomics	3
ECON 343 Intermediate Macroeconomics	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
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	
First Year Experience:	
AGRI 150 Agriculture Orientation	1
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 331 Regression Analysis	2-3
or ECON 410 Econometrics	
Minor Requirement	19-24
In addition to the requirements for the major in Agribusiness, students must complete a minor in Accounting (19 cr) or Business Administration (24 cr).	
Degree Requirements: Potential of a minimum of 10 credits to reach 128	10
Total Credits	128-136

Areas of Specialization: Select one

Finance - 6 Credits

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

Total Credits **6**

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 472	International Trade	

Total Credits **6**

Marketing - 6 Credits

AGEC 444	Commodity Trading	3
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Select one of the following:		3
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AGEC 350	Agrisales	
AGEC 474	Cooperatives	
AGEC 450 & AGECEC 451	National AgriMarketing Association (NAMA) I and National AgriMarketing Association (NAMA) II	
ECON 472	International Trade	

Total Credits **6**

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

Agribusiness Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
ECON 201	Principles of Microeconomics	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
Elective Courses: At least 4 additional credits from any 300-400 level course in Agribusiness & Applied Economics.		4
Total Credits		16

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

Freshman

Fall	Credits	Spring	Credits
AGRI 150 (not req if entering with over 24 cr)	1	ENGL 120	3
AGRI 189 (not req if entering with over 24 cr)	1	ECON 201	3
MATH 103 (pre-req for Math 144)	3	MATH 144	4

ENGL 110 (co-req Engl 100 writing lab)	3 Hum FA Elective	3
Wellness	2 - 3 Ag Sci Elective	3
Sci Tech Elective (with co-req lab)	4	
14-15		16

Sophomore

Fall	Credits Spring	Credits
AGEC 242	3 AGEC 244	3
ECON 202	3 AGEC 246	3
COMM 110	3 ECON 341	3
CSCI 116	4 ACCT 201	3
ACCT 200	3 Hum FA Elective	3
16		15

Junior

Fall	Credits Spring	Credits
AGEC 339	3 AGEC 344	3
ECON 343	3 AGEC 346	3
STAT 330	3 STAT 331	2
300 Level English	3 Sci Tech Elective	2
Minor Electives	3 Ag Sci Elective	3
	Minor Electives	3
15		16

Senior

Fall	Credits Spring	Credits
AGEC 444 or 446 (req additional 3 cr from select AGEC/ECON courses)	6 AGEC 445	3
Ag Sci Elective	3 Minor Electives or Free Electives	12
Upper Level Comm	3 AGEC 397	3
Minor Electives	6	
18		18

Total Credits: 128-129

Agricultural Economics

Agricultural Economics Major

Agricultural Economics applies economic principles to the use of private and public resources to provide a safe and affordable food supply, to produce renewable energies, to maintain a sustainable agricultural and natural resources base, and to manage natural and environmental resources for current and future generations.

Students majoring in Agricultural Economics may focus on management, marketing or finance in agriculture, food, and other bio-based systems. This major requires a broad background in the agricultural sciences, with courses from other departments in the College of Agriculture, Food Systems and Natural Resources providing students the scientific basis for applying economic concepts in decision making. Students, with guidance from their academic adviser, have the opportunity to select courses that best fit their career objectives and personal interests. The Agricultural Economics major is ideally suited for students with career interest in production agriculture, farm and natural resource policy analysis, industries providing service to agriculture, rural economic development, and risk management.

Core requirements in the Agricultural Economics major include introductory courses in agricultural management, marketing and finance. Students may choose to take all of the advanced courses in the department, yet flexibility allows building a program based on a student's individual career goals.

Major Requirements

Major: Agricultural Economics

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One course in Upper Level Writing. Select from the following:		3
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ENGL 320	Business and Professional Writing
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ENGL 321	Writing in the Technical Professions
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ENGL 324	Writing in the Sciences
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ENGL 358	Writing in the Humanities and Social Sciences
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ENGL 459	Researching and Writing Grants and Proposal
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CSCI 116	Business Use of Computers	4
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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. Select from current general education list.		6
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
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ECON 202	Principles of Macroeconomics	3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):

ECON 201	Principles of Microeconomics
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Total Credits		40
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Major Requirements

General Education Requirements		40
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Core Courses for Agricultural Economics

AGEC 242	Introduction to Agricultural Management	3
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AGEC 244	Agricultural Marketing	3
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AGEC 246	Introduction to Agricultural Finance	3
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AGEC 339	Quantitative Methods & Decision Making	3
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AGEC 375	Applied Agricultural Law	3
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or AGECE 484	Agricultural Policy	
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Select one of the following:		3
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AGEC 342	Farm and Agribusiness Management II
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AGEC 344	Agricultural Price Analysis
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AGEC 346	Applied Risk Analysis
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Agribusiness & Applied Economics Electives: A minimum of 9 credits of 300-400 AGECE or ECON electives		9
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Agriculture Science & Technology:		9
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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	Commodity Trading	
AGEC 445	Agribusiness Industrial Strategy	
AGEC 446	Agribusiness Finance	
Support Area:		
ECON 341	Intermediate Microeconomics	3
ECON 324 or ECON 343	Money and Banking 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		
First Year Experience:		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take 150.)	1
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 331 or ECON 410	Regression Analysis Econometrics	2-3
Degree Electives: Potential of 30 credits to reach 128		30
Total Credits		128-132

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.

Degree Requirements and Notes

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

Freshman			
Fall	Credits	Spring	Credits
AGRI 150 (not req if entering with over 24 cr)	1	ECON 201	3
AGRI 189 (not req if entering with over 24 cr)	1	MATH 144	4
MATH 103 (pre-req for Math 144)	3	ENGL 120	3
ENGL 110 (co-req Engl 100 writing lab)	3	Hum FA Elective	3
Wellness	2-3	Ag Sci Elective	3
Sci Tech Elective (with co-req lab)	4		
	14-15		16
Sophomore			
Fall	Credits	Spring	Credits
COMM 110	3	AGEC 244	3
AGEC 242	3	AGEC 246	3
ECON 202	3	ECON 341	3

CSCI 116	4 Ag Sci Elective	3
Sci Tech Elective	2 Hum FA elective	3
15		15
Junior		
Fall	Credits Spring	Credits
AGEC 339	3 AGEC 344 or 346 (or 342 in Fall)	3
ECON 324 or 343	3 ACCT 201	3
ACCT 102 or 200	3 AGEC 300/400 Elective	3
STAT 330	3 300 Level English	3
Upper Level Comm	3 Ag Sci Elective	3
	STAT 331	2
15		17
Senior		
Fall	Credits Spring	Credits
AGEC 375 (or AGEC 484 in Spring)	3 AGEC 300/400 Elective	3
AGEC 300/400 Elective	3 AGEC 420 or 445 (Capstone)	3
AGEC 444 or 446 (Capstone)	3 Free Electives	12
Free Electives	9	
18		18

Total Credits: 128-129

Economics

Economics Major

Besides being invaluable for understanding contemporary political, economic and social issues, students majoring in Economics are well-prepared for careers in business, law, education, public administration, and research. Economics courses cover a wide range of applications and theory in managerial economics, labor markets, economic development, market structure, natural resources and environmental economics, and globalization and trade. Areas of specialization may emphasize such fields as money and banking, international economics, industrial organization, environmental and resource economics, and public finance.

The department offers two tracks within the Economics majors:

- **General Economics:** This track offers students more flexibility in terms of economics field course selection—15 credits of economics electives, 3 credits of which may be in agricultural economics, finance, and business administration.
- **Quantitative Economics:** This 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.

Undergraduate students majoring in Economics may choose either the Bachelor of Arts degree which requires an additional three credits from 300-400 level humanities, social sciences or study abroad as well as second year language proficiency, or the Bachelor of Science degree which requires students to complete a minor of study from another discipline.

Economics Minor

The minor in Economics complements many other majors by helping the student develop an analytical approach to understanding human events from the perspective of this discipline. A minimum of eight credits must be completed at NDSU.

Economics - Standard Option (p. 89)

Economics - Quantitative Option (p. 88)

Minor Requirements

Economics Minor

Minor Requirements

Required Credits: 18-19

Required Courses

ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341 or BUSN 487	Intermediate Microeconomics Managerial Economics	3-4
ECON 343	Intermediate Macroeconomics	3

Elective Courses

ECON 300-400	Elective	3
ECON 400	Elective	3

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.

Freshman

Fall	Credits	Spring	Credits
AGRI 189	1	ECON 201	3
MATH 103 (pre-req for Math 144)	3	ENGL 120	3
ENGL 110 (co-req Engl 100 writing lab)	3	Hum FA Elective	3
CSCI 116	4	MATH 144	4
Soc Behavioral Sci Elective	3	Wellness	2 - 3
	14		15-16

Sophomore

Fall	Credits	Spring	Credits
ECON 202	3	ECON 341	3
STAT 330 (or STAT 367 for Quantitative Option)	3	Hum FA Elective	3
Soc Behavioral Sci Elective	3	Sci Tech Elective	2
Sci Tech Elective (co-req lab)	4	STAT 331	2
COMM 110	3	Minor Electives	6
	16		16

Junior

Fall	Credits	Spring	Credits
ECON 343	3	ECON 400 Elective	3
ECON 410 or 400 (required for Quantitative Option)	3	300 Level English	3
Hum FA Elective	3	Minor or Free Electives	9
Minor or Free Electives	3-4	MATH 266 or STAT 368 (if taking Quantitative Option)	3
MATH 259 or 265 (if taking Quantitative Option)	3-4		
	15-17		18

Senior		
Fall	Credits Spring	Credits
ECON 400 Elective	3 ECON 400 Elective	6
Minor or Free Electives	12 Minor or Free Electives	12
	15	18

Total Credits: 127-130

Economics - Quantitative Option

Major: Economics- Quantitative Option

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CSCI 116	Business Use of Computers	4
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. Select from current general education list		6

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspective (G):

ECON 201	Principles of Microeconomics	3
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Total Credits 41

Major Requirements

The declaration of a MATHEMATICS or STATISTICS minor is required.

General Education Requirements 40

Required Core Courses for Economics Quantitative Option

ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
ECON 410	Econometrics	3

Economics Electives: Select 6 credits from the following; at least 3 credits must be an approved capstone.		6
ECON 440	Game Theory and Strategy (Approved as capstone)	
ECON 456	History of Economic Thought	
ECON 461	Economic Development (Approved as capstone)	
ECON 465	Labor Economics	
ECON 470	Public Economics (Approved as capstone)	
ECON 472	International Trade	
ECON 476	Monetary Theory and Policy	
ECON 480	Industrial Organization (Approved as capstone)	
ECON 481	Natural Resource Economics	
ECON 482	Environmental Economics	
Additional Electives:		
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3-4
or MATH 265	Calculus III	
MATH 266	Introduction to Differential Equations	3
or STAT 368	Statistics	
STAT 367	Probability	3
or STAT 467	Probability and Mathematical Statistics I	
Additional Requirements		
Humanities & Fine Arts: May be selected from the current general education list or any course with a prefix of: ART, CLAS, ENGL, FREN, GERM, HIST, HUM, MUSC, PHIL, SPAN, or THEA.		3
Social & Behavioral Sciences: Three (3) credits must be selected from the current general education list while the remaining three (3) credits may be any course with a prefix of: ANTH, CJ, GEOG, POLS, PSYC, or SOC.		6
Degree Requirements: Potential of 51 credits to reach 128		51
Total Credits		128-129

Degree Requirements and Notes

- Students must earn, at least, a 2.00 cumulative GPA that is based on the courses that satisfy major requirements.
- The Economics Quantitative option is available as a Bachelor of Science degree only.

Economics - Standard Option

Major Requirements

Major: Economics (Standard Option)

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

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CSCI 116	Business Use of Computers	4
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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. Select from current general education list. 6

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
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ECON 202	Principles of Macroeconomics	3
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Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 201	Principles of Microeconomics	3
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Total Credits 40

Major Requirements

General Education Requirements 40

Required Courses for Economics

ECON 201	Principles of Microeconomics	3
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ECON 202	Principles of Macroeconomics	3
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STAT 330	Introductory Statistics	3
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ECON 341	Intermediate Microeconomics	3
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ECON 343	Intermediate Macroeconomics	3
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Economics Electives: Select 15 credits from the following; 3 credits must be an approved capstone: 15

ECON 410	Econometrics
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ECON 440	Game Theory and Strategy (Approved as capstone)
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ECON 456	History of Economic Thought
----------	-----------------------------

ECON 461	Economic Development (Approved as capstone)
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ECON 465	Labor Economics
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ECON 470	Public Economics (Approved as capstone)
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ECON 472	International Trade
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ECON 476	Monetary Theory and Policy
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ECON 480	Industrial Organization (Approved as capstone)
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ECON 481	Natural Resource Economics
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ECON 482	Environmental Economics
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Select no more than 3 credits from the following as part of the 15 economics electives:

AGEC 339	Quantitative Methods & Decision Making
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AGEC 344	Agricultural Price Analysis
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AGEC 346	Applied Risk Analysis
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AGEC 347	Principles of Real Estate
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AGEC 445	Agribusiness Industrial Strategy
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AGEC 446	Agribusiness Finance
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ECON 324	Money and Banking
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FIN 410	Investment Analysis and Management
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FIN 420	Options, Futures, and Other Derivatives
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FIN 430	Management of Financial Institutions
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FIN 440	International Finance
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FIN 450	Money and Capital Markets
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FIN 460	Corporate Finance
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BUSN 487	Managerial Economics
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Mathematics Requirements (6-7 credits):

MATH 144	Mathematics for Business (or any higher math)	4
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STAT 331	Regression Analysis	2-3
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- This minor must be officially declared (<https://www.ndsu.edu/business/majorsminorslist/minors>); see the College of Business for information.
- A minimum of 8 credits must be taken at NDSU.

Department of Agricultural and Biosystems Engineering

www.ndsu.edu/aben/

www.ndsu.edu/aben

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 Engineering houses two separate majors; Agricultural and Biosystems Engineering (p. 296) and Agricultural Systems Management (p. 92). 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.

Our students are active in a variety of extra-curricular programs (<https://www.ndsu.edu/aben/clubs>). Feel free to view all we have to offer!

Agricultural Systems Management (p. 92)

See College of Engineering (p. 290) for the Agricultural and Biosystems Engineering (p. 296) major.

Agricultural Systems Management

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 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. Students focus on the application of engineering designs, the study of technology used in agriculture, and the integration of business management concepts in the agricultural, food, and closely related industries. Students complete courses in machinery principles, off-road power systems, precision agriculture, commodity handling and processing, natural resources management, electrical and electronic systems, and information and decision support technology.

Taking courses in accounting, economics, marketing, management, business law, sales, and finance develops a strong business background. Personal career objectives may be pursued through specialization in areas such as agribusiness and production agriculture. Students are encouraged to minor in agribusiness, business administration, communication, or another agricultural discipline.

Agricultural Systems Management graduates are often self-employed as owners/operators of commercial farms, ranches, and businesses. Others are employed in positions that provide the link between the consumer and people in fields such as research design, engineering, or manufacturing. They are often also employed as crop consultants or production specialists. Employers include:

1. companies and agencies that provide inputs, products, and services for agricultural production;
2. companies or agencies in the business of handling, storing, processing, and distributing agricultural products/commodities and processed food or non-food products; and
3. companies and agencies that supply physical and business services to rural and urban communities.

This degree is ideal for those interested in careers in technical sales or management of an agriculture-related business involved in production, processing, or manufacturing. The flexibility of the program allows students the opportunity to tailor the curriculum to complement their career goals.

Students interested in the design, testing, manufacturing, and development aspects of products, processes, or systems for agricultural production, food, and value-added processing of commodities, or sustainable management of environmental resources should consider the Agricultural and Biosystems Engineering (p. 296) curriculum in the College of Engineering (p. 290).

Curriculum Options

- **Production Agriculture:** Students select courses in agricultural sciences and supporting areas to achieve career goals in the technical and management aspects of production agriculture systems.

- **Applied Business:** Students select courses in agribusiness, business, and related areas to achieve career goals in agricultural and related areas to achieve career goals in agricultural and related business areas.
- **Dealership Management:** This option is designed for students who want careers as equipment dealership managers or with equipment manufacturers. Technology, agribusiness, and communication are emphasized. Requirements include a minor in business administration or agribusiness, two paid internships with equipment dealerships, and an additional communication course.

Agricultural Systems Management Minor

A minor in Agricultural Systems Management is available to students from other majors by working with department faculty to select 16-21 credits in Agricultural Systems Management. A minimum of eight credits must be completed at NDSU.

Major Requirements

Major: Agricultural Systems Management

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take ABEN 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		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 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspective (G):

ECON 201	Principles of Microeconomics	3
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Total Credits 40

Major Requirements

Students must maintain a 2.25 GPA in ASM prefix courses.

General Education Requirements 40

Agricultural Systems Management Core Requirements

ASM 115	Fundamentals of Agricultural Systems Management (Students transferring in 32 or more credits do not need to take ASM 115)	3
ASM 125	Fabrication & Construction Technology (Students transferring in more than 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 454	Principles and Application of Precision Agriculture	3
ASM 475	Management of Agricultural Systems (Capstone Course)	2
ASM 491	Seminar	1
ASM 496	Field Experience (Expo)	1

Supporting Courses

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	
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
CSCI 114 or CSCI 116	Microcomputer Packages Business Use of Computers	3-4
MATH 103	College Algebra (or higher - May not be required based on math placement.)	3
MATH 105	Trigonometry (or higher)	3
PSYC 111	Introduction to Psychology	3

Specialized Options - Select from one of the specialized options listed below. A minor program of study may be completed in place of an option. 27-35

Degree Electives: Potential of 9 credits to reach 128 9

Total Credits 128-140

specialized options**Applied Business Option: Minimum 27 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.

Production Agriculture Option: Minimum of 27 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.

Dealership Management Option: Minimum 28-35

Minor in either Business Administration (24 credits) or Agribusiness (17 or 21 credits) required. 17-24

ACCT 200 & ACCT 201	Elements of Accounting I and Elements of Accounting II	6
ASM 496	Field Experience	2

Select one of the following: 3

COMM 214	Persuasive Speaking	
COMM 271	Listening and Nonverbal Communication	
COMM 308	Business and Professional Speaking	
COMM 315	Small Group Communication	

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.
- Option suggestions are: Accounting, Agribusiness, Animal Sciences, Business Administration, Construction Management, Crop & Weed Sciences, Industrial Engineering & Management, Public Relations & Advertising, or Range Science.

Minor Requirements

Agricultural Systems Management

Minor Requirements

Required Credits: 16

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.

ACCT 201	Elements of Accounting II	3
AGEC 2XX - 4XX		
ANSC 1XX - 4XX		
BUSN 340	International Business	3
BUSN 487	Managerial Economics	4
BUSN 3XX/4XX		
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
COMM 260	Introduction to Web Design	3
COMM 308	Business and Professional Speaking	3
COMM 313	Editorial Processes	3
COMM 362	Principles of Design For Print	3
COMM 434	Communication Law	3
COMM 482		3
COMM 484	Organizational Advocacy and Issue Management	3
COMM 485	Risk and Crisis Communication	3
ECON 105	Elements of Economics	3
ECON 341	Intermediate Microeconomics	3
ECON 343	Intermediate Macroeconomics	3
ECON 3XX/4XX		
ENT 2XX - 4XX		

FIN 320	Principles of Finance (FIN 3XX/4XX)	3
FIN 3XX/4XX		
GEOG 455	Introduction to Geographic Information Systems	4
GEOG 456	Advanced Geographic Information Systems	3
GEOG 470	Remote Sensing	3
GEOG 480	Geographic Information Systems Pattern Analysis and Modeling	3
IME 335	Welding Technology	3
MGMT 320	Foundations of Management	3
MGMT3XX/4XX		
MRKT 320	Foundations of Marketing	3
MRKT 3XX/4XX		
ME 311	Introduction To Aviation	3
ME 312	Introduction to Flight	2
ME 313	Commercial Instrument Ground School	3
PLSC 1XX - 4XX		
RNG 336	Introduction to Range Management	3
SOIL 2XX - 4XX		

Department of Animal Sciences

www.ag.ndsu.edu/ansc

The Department of Animal Sciences offers three majors: (1) Animal Science; (2) Equine Science; and (3) Veterinary Technology. Each of these 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, 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 or Equine Science. Working with an academic adviser to meet entrance requirements is important.

Transfer Credits: Transfer courses with grade 'C' or better only will be accepted for Animal Science and Equine Science courses in the major.

Animal Health (p. 96)

Animal Science (p. 97)

Equine Science (p. 103)

Large Animal Veterinary Technology (p. 106)

Therapeutic Horsemanship (p. 107)

Therapeutic Riding (p. 107)

Veterinary Technology (p. 108)

Animal Health Management

Animal Health Management Certificate

The undergraduate certificate program in Animal Health teaches principles of animal disease management, control, eradication and identification based on actual case studies diagnosed in the upper Midwest. This approach allows students to research, think through, and make decisions about animal disease situations that represent real world scenarios. The training will equip students to make good decisions about animal health questions.

Certificate Requirements

Animal Health Management

Certificate Requirements

Required Credits: 16

Requirements

ANSC 114	Introduction to Animal Sciences	3
or ANSC 260	Introduction to Equine Studies	
or MICR 202	Introductory Microbiology	
or MICR 350	General Microbiology	
VETS 135	Anatomy and Physiology of Domestic Animals	3
On-line Modules: Select 5 sections of Animal Health Management		5
ANSC 378	Animal Health Management <small>Beef, Dairy, Sheep, Equine, Swine, Bison, Feline, and Canine sections</small>	
Electives: Select 5 credits from the following:		5
ANSC 370	Fundamentals/Animal Disease	
MICR 450	Infectious Disease Pathogenesis	
MICR 460	Pathogenic Microbiology	
MICR 470	Basic Immunology	
MICR 475	Animal Virology	
Total Credits		16

Minor Requirements and Notes:

- Students must earn a 2.00 minimum GPA in the courses used to satisfy the certificate requirements.

Animal Science

Animal Science Major

The Animal Science major 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 that provide animals and animal products that benefit humans.

Curriculum Options

Five study options are available for the animal science major.

- **Animal Production, Management and Husbandry:** This option is designed for students desiring a background in the principles of animal management and husbandry. It includes broad training in animal husbandry, production and management. Employment opportunities include careers in livestock production, allied support fields, and in technical support fields including agricultural positions within the Cooperative Extension Service.
- **Animal Biomedical Science:** This option offers students a more scientific approach to animal science, preparing them for veterinary medicine, graduate research in animal science, teaching, food technology and the biotechnology industry. Students may 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 as they apply to the livestock industry. It leads to broad training in animal husbandry, production, business, and management. Employment opportunities include careers in agribusiness, sales and marketing of livestock and products for the livestock industry, and a variety of public and private institutions which serve the business of animal agriculture.
- **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. Employment opportunities include working for a variety of media outlets including print and virtual media, TV, radio, magazines, breed associations, or commodity organizations as well as positions involved in public relations in the livestock industry.
- **Meat Science:** This option provides the opportunity to emphasize knowledge about the science of muscle biology and evaluation and processing of red meat. This option prepares students for a broad variety of career opportunities in the meat industry including management, sales, meat inspection, and meat marketing.

Animal Science Minor

Students from other majors may minor in Animal Science by completing a minimum of 16 credits. A minimum of eight credits must be completed at NDSU.

Major Requirements

Major: Animal Science

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Upper-Level Writing. Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

Select one sequence from the following based on major option:		10
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For Options 1 and 5:

CHEM 117	Chemical Concepts and Applications
or CHEM 121	General Chemistry I

CHEM 117L	Chem Concepts and Applications Lab
or CHEM 121L	General Chemistry I Laboratory

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab
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PLSC 315	Genetics
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For Options 2 and 4:

BIOL 111	Concepts of Biology (BIOL 111L is also required. BIOL 150 may be substituted but is not a general education science and technology course.)
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CHEM 117	Chemical Concepts and Applications
or CHEM 121	General Chemistry I

CHEM 117L	Chem Concepts and Applications Lab
or CHEM 121L	General Chemistry I Laboratory

PLSC 315	Genetics
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For Option 3:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory
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CHEM 122	General Chemistry II
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PLSC 315	Genetics
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
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Select from current general education list		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):

ECON 201	Principles of Microeconomics	3
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Total Credits		40
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Major Requirements

General Education Requirements		40
Required Core Courses for Animal Science		
MATH 103	College Algebra (or higher level; except MATH 104)	3
ANSC 114	Introduction to Animal Sciences	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Select one of the following (Students transferring in 24 or more credits do not need to take AGRI 150/ANSC 150/VETS 150.):		1
AGRI 150	Agriculture Orientation	
ANSC 150	Animal Science Orientation	
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
Select one of the following:		1
ANSC 393	Undergraduate Research (research experience)	
ANSC 396	Field Experience (internship experience)	
ANSC 478	Research and Issues in Animal Agriculture	3
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 486	Beef Industry and Production Systems	
ANSC 488	Dairy Industry and Production Systems	
Options: Select one of the five options listed below.		35-41
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.		
Degree Requirements: Potential of a minimum of 14-20 credits to reach 128.		20-14
Total Credits		128

Option 1: Animal Production, Management, & Husbandry Option - 36 Credits

BIOL 111	Concepts of Biology	3
or BIOL 150	General Biology I	
BIOL 111L	Concepts of Biology Lab	1
or BIOL 150L	General Biology I Laboratory	
PLSC 110	World Food Crops	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
CHEM 260	Elements of Biochemistry	4
Select one the following evaluation courses:		2
ANSC 232	Dairy Cattle Evaluation	
or ANSC 230	Meat Grading and Evaluation	
or ANSC 231	Livestock Evaluation	
or 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
PLSC 320	Principles of Forage Production	3
or RNG 336	Introduction to Range Management	

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 486	Beef Industry and Production Systems	
or ANSC 488	Dairy Industry and Production Systems	

Total Credits **36**

Option 2: Animal Agribusiness Option - 38 Credits

ACCT 102	Fundamentals of Accounting	3
BIOL 111L	Concepts of Biology Lab	1
or BIOL 150L	General Biology I Laboratory	
ECON 202	Principles of Macroeconomics (will fulfill Social/Behavioral Science)	3
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Introduction to Agricultural Finance	3
Select one of the following evaluation courses:		2
ANSC 232	Dairy Cattle Evaluation	
or ANSC 230	Meat Grading and Evaluation	
or ANSC 231	Livestock Evaluation	
or ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2
AGEC elective	300-400 level	4
Animal Agribusiness electives - 11 Credits (Students may choose from upper level ANSC, AGECE, COMM, ECON, PLSC or RNG)		11

Total Credits **38**

Option 3: Biomedical Science Option - 40-41 Credits

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

CHEM 122L	General Chemistry II Laboratory	1
PHYS 120	Fundamentals of Physics	3
or PHYS 211	College Physics I	
PHYS 120L	Fundamentals of Physics Laboratory	1
or PHYS 211L	College Physics I Laboratory	
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 240	Survey of Organic Chemistry	3
or CHEM 341	Organic Chemistry I	
CHEM 260	Elements of Biochemistry	3-4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
Select one of the following evaluation courses:		2
ANSC 232	Dairy Cattle Evaluation	
or ANSC 230	Meat Grading and Evaluation	
or ANSC 231	Livestock Evaluation	
or ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
or ANSC 455		
ANSC 444	Livestock Muscle Physiology	3

Biomedical Science electives – 8 Credits (Students may choose from upper level ANSC, BIOC, BIOL, CHEM, MICR, PHYS OR SAFE) 8

Total Credits 40-41

Option 4: Livestock Media Option - 35 Credits

BIOL 111L	Concepts of Biology Lab	1
or BIOL 150L	General Biology I Laboratory	
AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
Select one of the following evaluation courses:		2
ANSC 232	Dairy Cattle Evaluation	
or ANSC 230	Meat Grading and Evaluation	
or ANSC 231	Livestock Evaluation	
or ANSC 235	Equine Evaluation	
ANSC 357	Animal Genetics	3
ANSC 380	Livestock Sales and Marketing	2

Complete any minor in the communication area (21 credits) OR complete the following COMM courses: 21

COMM 112	Understanding Media and Social Change	
COMM 114	Human Communication	
or COMM 212	Interpersonal Communication	
or COMM 216	Intercultural Communication	
COMM electives. Select 15 credits of the following:		
COMM 200	Introduction to Media Writing	
COMM 230		
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	
COMM 261	Introduction to Web Development	
COMM 362	Principles of Design For Print	
COMM 375	Principles of Strategic Communication	
COMM 376	Advertising Creative Strategies	
COMM 377	Advertising Media Planning	
COMM 400-level		

Total Credits 35

Option 5: Meat Science Option - 36-37 Credits

BIOL 111	Concepts of Biology	3
or BIOL 150	General Biology I	
BIOL 111L	Concepts of Biology Lab	1
or BIOL 150L	General Biology I Laboratory	
AGEC 244	Agricultural Marketing	3
CHEM 260	Elements of Biochemistry	4
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
CFS 210	Introduction to Food Science and Technology	2
CFS elective	300-400 Level	3
Meat Science electives– 8 Credits (Students may choose from upper level ANSC, BIOC, CFS, CHEM, MICR OR SAFE)		8

Total Credits 37

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

Animal Science Minor

Minor Requirements

Required Credits: 16

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 323	Fundamentals of Nutrition
ANSC 324	Applied Animal Nutrition
ANSC 340	Principles of Meat Science
ANSC 344	Fundamentals of Meat Processing
ANSC 357	Animal Genetics
ANSC 370	Fundamentals/Animal Disease
ANSC 380	Livestock Sales and Marketing
ANSC 444	Livestock Muscle Physiology
ANSC 455	
ANSC 463	Physiology of Reproduction
ANSC 466	Principles of Mixed Feed Technology, Production and Management
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 331	Competitive Livestock Evaluation

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.

Freshman

Fall	Credits	Spring	Credits
This Plan of Study applies to Animal Production, Management, and Husbandry study option (Option 1). For other options see the departmental website.		ANSC 240	3
AGRI 189	1	BIOL 111 or 150	3
ANSC 114	3	BIOL 111L or 150L	1
ANSC 150, VETS 150, or AGRI 150	1	ENGL 120 (ENGL 110 or placement as prerequisite)	3
VETS 135	3	PLSC 110	3
MATH 103	3	Humanity or Fine Art ^{One course needs to be a Cultural Diversity}	3

CHEM 117 or 121	3	
CHEM 117L or 121L	1	
	15	16

Sophomore

Fall	Credits	Spring	Credits
ANSC 331	2	CHEM 260	4
AGEC 242	3	AGEC 244	3
MICR 202	2	STAT 330	3
MICR 202L	1	PLSC 315	3
COMM 110	3	Humanity or Fine Art	3
ECON 201 ^{Social Science and Global Perspective course}	3		
Humanity or Fine Art	3		
	17		16

Junior

Fall	Credits	Spring	Credits
ANSC 300	3	ANSC 324	3
ANSC 323	3	ANSC 340	3
ANSC 370	3	ANSC 357	3
RNG 336 or PLSC 320	3	ANSC 380	2
ENGL 320	3	ANSC 463	3
Wellness	2	ANSC 463L	1
	17		15

Senior

Fall	Credits	Spring	Credits
ANSC 394 or 396	1-5	ANSC 480, 484, or 486	3
ANSC 482 or 488	3	ANSC 478	3
Social or Behavior Science	3	Elective ^{Some are guided}	10
Elective ^{Some are guided}	9-5		
	16		16

Total Credits: 128

Equine Science

Equine Science Major

The Equine Science major is designed to prepare students for careers in the equine industry and related fields. Course work includes practical husbandry and equitation skills, scientific principles related to management and study of equine industry and business practices.

Equine Science Minor

Students from other majors may minor in Equine Science by completing a minimum of 16 credits. A minimum of eight credits must be completed at NDSU.

Equine Science Certificate

The certificate program in Equine Science provides an opportunity for non-degree seeking students to enhance their horse knowledge. The program focuses on basic selection, management, and business concepts and requires completion of 16 credits. Prospective students are subject to the university's admission policies and procedures.

Major Requirements

Major: Equine Science

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
One Course in Upper Level Writing. Select from current general education list		3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 110	World Food Crops	3

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
Select from current general education courses		3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspective (G):

PLSC 110	World Food Crops	
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Total Credits 40

Major Requirements

General Education Requirements 40

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 480	Equine Industry and Production Systems	3
ANSC 478	Research and Issues in Animal Agriculture	3
RNG 336	Introduction to Range Management	3
or PLSC 320	Principles of Forage Production	
ANSC 393	Undergraduate Research	2
or ANSC 396	Field Experience	
ANSC/ZOO 463	Physiology of Reproduction	3
ANSC/ZOO 463L	Physiology of Reproduction Laboratory	1
ANSC	Electives	6

Supporting Courses

AGEC 242	Introduction to Agricultural Management	3
AGEC 244	Agricultural Marketing	3
Select one of the following (Students transferring in 24 or more credits may be exempt from this requirement):		1
AGRI 150	Agriculture Orientation	
ANSC 150	Animal Science Orientation	
VETS 150	Introduction to the Veterinary Profession	
ANSC 370	Fundamentals/Animal Disease	3
CHEM 260	Elements of Biochemistry	4
MATH 103	College Algebra (or higher level; except MATH 104)	3
BIOL 111 & 111L or BIOL 150 & 150L	Concepts of Biology and Concepts of Biology Lab General Biology I and General Biology I Laboratory	4
PLSC 315	Genetics	3
VETS 135	Anatomy and Physiology of Domestic Animals	3
Degree Requirements: Potential of 23 credits to reach degree minimum of 128.		23
Total Credits		128

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**Equine Science Minor****Minor Requirements****Required Credits: 16****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 361	Intermediate Horsemanship	
ANSC 362	Colts in Training	
ANSC 375	Methods of Horsemanship Instruction	
ANSC 461	Advanced Horsemanship and Equitation	
ANSC 463	Physiology of Reproduction	
ANSC 480	Equine Industry and Production Systems	
ANSC 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.

Certificate Requirements

Equine Science Certificate

Certificate Requirements

Required Credits: 16

Requirements

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
AGEC 242	Introduction to Agricultural Management	3
ANSC 360	Equine Nutrition	3
ANSC 361	Intermediate Horsemanship	1
ANSC 364	Equine Anatomy and Physiology	3

Total Credits

16

Large Animal Veterinary Technology

Large Animal Veterinary Technology Minor

The minor in Large Animal Veterinary Technology 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.

Minor Requirements

Large Animal Veterinary Technology

Minor Requirements

Required Credits: 16

Required Courses

ANSC 223	Introduction to Animal Nutrition	2
ANSC 220	Livestock Production	3
or ANSC 463	Physiology of Reproduction	
ANSC 260	Introduction to Equine Studies	2
VETS 482	Large Animal Techniques	2
VETS 482L	Large Animal Techniques Laboratory	1

Elective Courses: Select 6 credits from the following:

6

ANSC 220	Livestock Production	
ANSC 260L	Equine Care and Management Practicum	
ANSC 300	Domestic Animal Behavior and Management	
ANSC 323	Fundamentals of Nutrition	
ANSC 360	Equine Nutrition	
ANSC 463 & 463L	Physiology of Reproduction and Physiology of Reproduction Laboratory	
ANSC 464	Reproduction Management Procedures	
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	

ANSC 196/496

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.
- This minor can only be earned by students pursuing a Veterinary Technology major.

Therapeutic Horsemanship

Therapeutic Horsemanship Minor

The Therapeutic Horsemanship minor offers students from any major who possess basic horseback riding skills an opportunity to pursue their Professional Association of Therapeutic Horsemanship International instructor certification. This 16-credit experiential learning program focuses on concepts of equine assisted activities and therapies, horse management, knowledge of disabilities, and the application of skills needed to become a Therapeutic Horsemanship Instructor.

Minor Requirements

Therapeutic Horsemanship Minor

Minor Requirements

Required Credits: 17**Required Courses**

NDSU Courses:

ANSC 210	Introduction to Therapeutic Horsemanship	3
ANSC 260L	Equine Care and Management Practicum	1
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 310	Principles of Therapeutic Horsemanship Instruction	3
ANSC 361	Intermediate Horsemanship	1
ANSC 410	Therapeutic Horsemanship Teaching Practicum	1

MSUM Courses:

PE 320	Anatomical Kinesiology	3
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Choose one of the following courses from MSUM: 3

SPED 419	Biomedical Aspects of Physical/Health Disabilities	
SPED 417	Educating Students with Severe Disabilities	

First Aid & CPR Certification

HNES 210	Professional Rescuer CPR/AED and First Aid	1
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American Red Cross First Aid and CPR Certification at a Local Chapter. *

American Heart Association First Aid and CPR Certification at a Local Chapter. *

Total Credits**17**

- * Students completing First Aid and CPR through Local Chapters must present their certification to the department of Animal Science for verification of this certification. The department, along with the student, will complete a waiver form to submit to the Office of Registration and Records as record of the completion of these requirements for the minor.

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 requirements.
- ANSC 210 Introduction to Therapeutic Horsemanship may be substituted for SPED 320 Educational Services for Children with Exceptionalities (MSUM) as a prerequisite for SPED 419

Therapeutic Riding

Therapeutic Riding Certificate

The multidisciplinary certificate program in Therapeutic Riding offers non-degree seeking students possessing basic horseback riding skills an opportunity to pursue their Professional Association of Therapeutic Horsemanship International instructor certification. The 16-credit program focuses on concepts of equine assisted activities and therapies, horse management, knowledge of disabilities, and the application of skills needed to become a Therapeutic Riding Instructor.

Certificate Requirements

Therapeutic Riding Certificate

Certificate Requirements

Required Credits: 17

NDSU Requirements

ANSC 210	Introduction to Therapeutic Horsemanship	3
ANSC 260L	Equine Care and Management Practicum	1
ANSC 261	Basic Equitation & Horsemanship	1
ANSC 310	Principles of Therapeutic Horsemanship Instruction	3
ANSC 361	Intermediate Horsemanship	1
ANSC 410	Therapeutic Horsemanship Teaching Practicum	1

MSUM Requirements

PE 320	Anatomical Kinesiology	3
Choose one of the following from MSUM:		3
SPED 419: Biomedical Aspects of Physical & Health Disabilities		
SPED 417: Educating Students with Severe Disabilities		

First Aid & CPR Certification

HNES 210	Professional Rescuer CPR/AED and First Aid	1
HLTH 125	First Aid and CPR (MSUM)	
American Red Cross First Aid and CPR Certification at a Local Chapter. *		
American Heart Association First Aid and CPR Certification at a Local Chapter. *		

Total Credits

17

* Students completing First Aid and CPR through Local Chapters must have a representative from the department of Animal Science complete a waiver form for submission to the Office of Registration and Records as record of completion for the minor.

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- ANSC 210 Introduction to Therapeutic Horsemanship may be substitute for SPED 320 Education Service for Children with Exceptionalities (MSUM) as a prerequisite for SPED 419.
- SPED 419 is recommended for non-education majors.

Veterinary Technology

Veterinary Technology Major

Veterinary Technology is an exciting and challenging major that offers a multitude of career opportunities in animal health care and related areas. This major offers a well-rounded program of general and clinical studies. Graduates are prepared not only for traditional veterinary practice careers, but also for pursuit of emerging non-traditional careers through the choice of electives and minor areas of study.

The first pre-professional year of the Veterinary Technology program is open to all interested students and offers an opportunity to explore the veterinary technology field. Advancement into the professional program in the second year is limited to a maximum of 28 students who are selected on a competitive basis.

The Veterinary Technology program is accredited by the American Veterinary Medical Association.

Major Requirements

Major: Veterinary Technology

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F)

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing: Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

BIOL 111	Concepts of Biology	3
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CHEM 117	Chemical Concepts and Applications	3
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or CHEM 121	General Chemistry I	
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CSCI 114	Microcomputer Packages	3-4
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or CSCI 116	Business Use of Computers	
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MICR 202	Introductory Microbiology	3
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& 202L	and Introductory Microbiology Lab (MICR 202L See Required Vet Tech Courses)	
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Humanities & Fine Arts (A): Select from current general education courses		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		42
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Major Requirements

A grade of 'C' or better is required in all courses listed as a Major Requirement.

General Education Requirements		41
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Required Core Courses for Pre-Vet Tech

VETS 115	Medical Terminology for the Paraprofessional	1
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VETS 125	Animal Restraint	2
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VETS 130	Companion Animal Breeds	1
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VETS 135	Anatomy and Physiology of Domestic Animals	3
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VETS 136	Anatomy and Physiology Laboratory	1
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VETS 150	Introduction to the Veterinary Profession	1
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Required Core Courses for Professional Vet Tech: Must be admitted to the professional program to take the following courses.

VETS 255	Fundamentals of Veterinary Radiography	2
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VETS 255L	Fundamentals of Veterinary Radiography Laboratory	1
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VETS 256	Veterinary Clinical Techniques and Instruments	4
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VETS 357	Veterinary Pharmacology	3
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VETS 358	Veterinary Surgical Nursing Techniques	4
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VETS 359	Veterinary Hospital Information and Procedures	2
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VETS 385	Veterinary Clinical Pathology I	3
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VETS 386	Veterinary Clinical Pathology II	3
VETS 387	Veterinary Clinical Pathology III	3
VETS 482	Large Animal Techniques	2
VETS 485	Veterinary Technology Externship 6-12 (Capstone Course)	6
VETS 481	Ward Care/Clinic Care (1 credit each X4) ¹	4
VETS 483	Clinical Veterinary Practicum 1-3 (1 credit each X4) ¹	4
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 399	Special Topics (ANSC Fundamentals/Animal Disease - Small Animals and Horses)	3
MICR 202L	Introductory Microbiology Lab	1
Degree Requirements: Potential of 25 credits to reach 128		25
Total Credits		128

¹ VETS 481 Ward Care/Clinic Care & VETS 483 Clinical Veterinary Practicum 1-3 requires multiple enrollments. Students are to register four different times for each of the one credit courses.

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 Studies, Large Animal Veterinary Technology, Microbiology, Psychology, or Range Science

Great Plains Institute of Food Safety

www.ag.ndsu.edu/foodsafety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Food Safety

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200 or CFS 210	Introduction to Food Systems Introduction to Food Science and Technology	2-3
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1

SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3
Supporting Courses		
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	3-4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Degree Requirements: Potential of a minimum of 36 credits to reach 128.		36
Total Credits		128-135

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 7 credits from the following:		7
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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
CFS 471	Food Processing Laboratory
CFS 480	Food Product Development
COMM 486	
EMGT 261	Disaster Preparedness
EMGT 263	Disaster Response
EMGT 461	Business Continuity and Crisis Management
HNES 141	Food Sanitation
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory
MICR 350 & 350L	General Microbiology and General Microbiology Lab
MICR 453	Food Microbiology
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
SAFE/COMM 485	Risk and Crisis Communication

Total Credits

16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU

School of Natural Resource Sciences

www.ndsu.edu/snrs

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, Range Science, Soil Science, and Entomology. Faculty in the School are nationally recognized and careers range from local agronomists to global resource policy makers.

Entomology (p. 113)

Natural Resources Management (p. 114)

Range Science (p. 121)

Soil Science (p. 123)

Entomology

www.ndsu.edu/entomology

Entomology, or the study of insects, provides a wide array of topics to study. The number of insect species outnumbers all other animal groups combined and affects humans, plants, animals, and the environment in a multitude of ways, some good, some bad. Many insect species attack our crops and our domestic animals, often vectoring diseases along with the physical damage they cause. Many species are beneficial in providing food (e.g. honey), pollination services, and many are biological control agents for noxious weeds and other insect pests. Areas of study within entomology range from the very basic (systematics and conservation ecology) to the very applied (insect pest management of regional crops). Professional career opportunities include positions within academia, private research companies, the government, and conservation organizations. The Entomology Department at NDSU does not offer a formal undergraduate degree, but several courses (General Entomology, Humans, Insects and the Environment,

Plant Resistance, and Insect Ecology) are available to interested students. Graduate programs in Entomology at NDSU emphasize a core curriculum (Ecology, Morphology, Physiology, and Systematics) as well as specialized training in research, extension and teaching.

Natural Resources Management

www.ndsu.edu/nrm

With increasing human pressure and a growing need to balance competing demands, our world needs new and better ways to manage society's impacts on the environment. The Natural Resources Management program prepares students for challenging careers requiring the sustainability perspective and global social perspective necessary for examining and solving complex natural resources management problems. Our goal is the highest and best societal uses of natural resources while maintaining the integrity of life-sustaining socio-ecological systems. Career opportunities abound in federal, state and local government, the private sector, non-profit conservation and environmental organizations, as well as higher education and research.

An interdisciplinary major in NRM leads to a Bachelor of Science (B.S.) degree. Students benefit from faculty engagement from the various colleges across the university in the coordination of the program, classroom teaching and advising.

During the first four semesters of the NRM program, students complete a broad foundation of core courses in the social, biological, and physical sciences. The second half of the program offers students the opportunity to focus on a specific area of interest (emphasis). NRM offers six emphasis areas, each allowing students the flexibility to select courses for specialized career preparation.

- **Biotic Resources Science:** deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of both natural and agro-ecosystems.
- **Environmental Communication:** is designed for environmentally oriented students preparing for careers in communication fields such as journalism, public relations, broadcast media and the internet.
- **Natural Resources Economics:** prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of natural resources management and allocation.
- **Physical/Earth Resources Science:** leads to an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, energy resources and land-use management.
- **Pollution Control:** focuses on the principles and practices of managing natural resources for pollution control. Topics include the technical aspects of pollution as they relate to water, air/solids, earth/soils, and the impact of environmental pollution on biotic factors. Students interested in this emphasis are strongly urged to complete College Algebra before entering the NRM program.
- **Social Sciences:** concentrates on human factors (social, political, anthropological) in environmental management and environmental disaster management, while recognizing constraints and opportunities presented by physical and biological factors.

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
GEOL 105	Physical Geology	3
NRM 225	Natural Resources & Agrosystems	3
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
Select one of the following:		3
POLS 110	Introduction to Political Science	
SOC 110	Introduction to Sociology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
ANTH 111	Introduction to Anthropology	
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
GEOL 105	Physical Geology	3
Total Credits		40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
NRM 150	Natural Resource Management Orientation	1
NRM/SOIL 264	Natural Resource Management Systems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
POLS 115 or POLS 215	American Government Problems and Policies In American Government	3
RNG 452 or GEOG 455	Geographic Information Systems in Range Survey Introduction to Geographic Information Systems	3
Select one of the following:		3
SOC 431	Environmental Sociology	
POLS 360	Principles of Public Administration	
POLS 422	State and Local Politics	
POLS 442	Global Policy Issues	
ANTH 462	Anthropology and the Environment	
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
SOIL 210	Introduction to Soil Science	
NRM Emphasis Area: Students must select one of the six NRM emphasis areas to complete the major. See below.		38
Degree Requirements: Potential of a minimum of 12 credits to reach 128.		12
Total Credits		123

Natural Resources Management Emphasis Areas

- Select and complete one emphasis area as part of the Natural Resources Management major.

- Declaring an Emphasis- Students should formally declare an emphasis area with the Office of Registration & Records (<https://www.ndsu.edu/registrar>) by the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Biotic Resources Science

Code	Title	Credits
Required. Select two of the following:		6
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
RNG 336	Introduction to Range Management	
RNG/NRM 453	Rangeland Resources Watershed Management	
Select a minimum of 32 credits from the approved electives list below for Biotic Resources:		32
BOT 314	Plant Systematics	
RNG 456	Range Habitat Management	
SOIL 217	Introduction to Meteorology & Climatology	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
PLSC 219	Introduction to Prairie & Community Forestry	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
PLSC/BOT/ZOO 315	Genetics	
PLSC/BOT/ZOO 315L	Genetics Laboratory	
RNG/NRM 454	Wetland Resources Management	
BOT/RNG 460	Plant Ecology	
MICR 202	Introductory Microbiology	
ZOO 450	Invertebrate Zoology	
ZOO 454	Herpetology	
ZOO 458	Mammalogy	
PLSC 355	Woody Landscape Plants	
RNG/BOT 450	Range Plants	
BOT 380	Plant Physiology	
RNG 458	Grazing Ecology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 477	Wildlife and Fisheries Management Techniques	
ENT 350	General Entomology	
ZOO 360	Animal Behavior	
ZOO 452	Ichthyology	
ZOO 456	Ornithology	
PLSC 323	Principles of Weed Science	
RNG 326	Modeling of Range and Agro-Ecosystems	
Total Credits		38

Physical/earth Resources Science

Code	Title	Credits
Required:		
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
GEOL 412	Geomorphology	3

or SOIL 444	Soil Genesis and Survey	
Select a minimum of 27 credits from the approved electives list below for Physical/Earth Resources Science:		27
ABEN 464	Resource Conservation and Irrigation Engineering	
ASM 354	Electricity and Electronic Applications	
RNG 336	Introduction to Range Management	
GEOL 105L	Physical Geology Lab	
GEOL 412	Geomorphology	
SOIL 444	Soil Genesis and Survey	
NRM 401	Urban-Ecosystem Management	
RNG/NRM 454	Wetland Resources Management	
NRM 420	Scenarios in Natural Resources Management	
PHYS 211	College Physics I	
CE 204	Surveying	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 410	Soils and Land Use	
MICR 202	Introductory Microbiology	
SOIL 465	Soil And Plant Analysis	
GEOL/CHEM 428	Geochemistry	
ASM 225	Computer Applications in Agricultural Systems Management	
PHYS 211L	College Physics I Laboratory	
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
GEOL 414	Hydrogeology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ASM 454	Principles and Application of Precision Agriculture	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 351	Soil Ecology	
SOIL 433	Soil Physics	
SOIL 447	Microclimatology	
SOIL 480	Soils and Pollution	

Total Credits**38****Environmental Communication**

Code	Title	Credits
Required:		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
Select one of the following:		4
COMM/POLS/CJ 325	Applied Research Methods	
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	
Select a minimum of 22 credits from the approved electives list below for Environmental Communication:		22
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	
COMM 301	Rhetorical Traditions	
NRM 420	Scenarios in Natural Resources Management	
COMM 433	Legal Communication	
COMM 442	Digital Media and Society	

COMM 445	Advanced Broadcast Production
COMM 472	Public Relations Campaigns
COMM 402	Contemporary Rhetoric
COMM 261	Introduction to Web Development
COMM 310	Advanced Media Writing
COMM 362	Principles of Design For Print
COMM 383	Organizational Communication I
NRM 421	Environmental Outreach Methods
COMM 436	Issues in Mass Communications
COMM 443	Mass Media and Public Opinion
COMM 450	Issues in Communication
COMM 431	Communication Ethics and Law

Total Credits**38****Pollution Control**

Code	Title	Credits
Required:		
CE 309	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
CE 408	Water Resources and Supply	3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 165	Calculus I	4
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
Select a minimum of 15 credits from the approved electives list below for Pollution Control:		15
Air/Solids:		
CE 472	Solid Waste Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 447	Microclimatology	
Biotic:		
ABEN 499	Special Topics	
BOT 380	Plant Physiology	
BOT/RNG 460	Plant Ecology	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
Earth/Soils:		
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Physics	
SOIL 444	Soil Genesis and Survey	
SOIL 447	Microclimatology	
SOIL 465	Soil And Plant Analysis	
SOIL 480	Soils and Pollution	
Water:		
ABEN 464	Resource Conservation and Irrigation Engineering	

CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 477	Applied Hydrology
CE 478	Water Quality Management
GEOL 414	Hydrogeology
RNG/NRM 453	Rangeland Resources Watershed Management
GEOL/CHEM 428	Geochemistry

Total Credits**38****Natural Resources Economics**

Code	Title	Credits
Required:		
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Select a minimum of 29 credits from the approved electives list below for Natural Resources Economics:		29
AGEC 339	Quantitative Methods & Decision Making	
AGEC 375	Applied Agricultural Law	
ECON 202	Principles of Macroeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 456	History of Economic Thought	
ECON 470	Public Economics	
ECON 480	Industrial Organization	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
POLS 220	International Politics	
POLS 442	Global Policy Issues	
POLS 452	Comparative Political Economy	
SOC 403	Sociology of The Great Plains	
SOC 439	Social Change	
AGEC 347	Principles of Real Estate	
AGEC 484	Agricultural Policy	
COMM 315	Small Group Communication	
ECON 324	Money and Banking	
ECON 410	Econometrics	
ECON 461	Economic Development	
ECON 472	International Trade	
HNES 427	Leisure And Society	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
POLS 360	Principles of Public Administration	
POLS 444	International Law	
POLS 453	Environmental Policy and Politics	
SOC 431	Environmental Sociology	

Total Credits**38****Social Sciences**

Code	Title	Credits
Required:		
SOC 405	Community Development	3

SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	4
Select a minimum of 31 credits from the approved electives list below for Social Science:		31
ANTH 204	Archaeology and Prehistory	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity	
CJ 201	Introduction to Criminal Justice	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 481	Disaster Analysis	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 421	Environmental Outreach Methods	
POLS 225	Comparative Politics	
POLS 422	State and Local Politics	
SOC 403	Sociology of The Great Plains	
SOC 422	Development Of Social Theory	
or ANTH 480	Development of Anthropological Theory	
SOC 418	Social Psychology	
SOC 431	Environmental Sociology	
SOC 443	International Disasters	
ANTH 205	Human Origins	
ANTH 433	Apes and Human Evolution	
ANTH 462	Anthropology and the Environment	
ANTH 481	Qualitative Methods in Cultural Anthropology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 262	Disaster Mitigation	
EMGT 264	Disaster Recovery	
EMGT 463	Voluntary Agency Disaster Services	
ENGL 474	Native American Literature	
NRM 420	Scenarios in Natural Resources Management	
POLS 215	Problems and Policies In American Government	
POLS 360	Principles of Public Administration	
POLS 453	Environmental Policy and Politics	
SOC 439	Social Change	
SOC 465	Applied Demographics	
Total Credits		38

Degree Notes:

- **Acceptable Substitutions:** The following courses are accepted as electives in all emphasis areas: NRM courses (may not be double-counted with the NRM Core); a maximum of 3 credits of Field Experience (396/496); a maximum of 3 credits of Co-op Ed (397/497). **All other substitutions require NRM advisor approval and a substitution form to be completed and submitted to the Office of Registration and Records** (<https://www.ndsu.edu/registrar>).

Minor Requirements**Natural Resources Management Minor****Minor Requirements**

Required Credits: 19

Code	Title	Credits
Core Courses		

NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
Interdisciplinary Courses		
Select four of the following:		12
ASM/NRM/SOIL 264	Natural Resource Management Systems	
BIOL/ZOO 364	General Ecology	
BOT/RNG 460	Plant Ecology	
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	
NRM 421	Environmental Outreach Methods	
NRM/RNG 453	Rangeland Resource/Watershed Management	
RNG 336	Introduction to Range Management	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
SOC 431	Environmental Sociology	
POLS 453	Environmental Policy and Politics	
RNG 452	Geographic Information Systems in Range Survey (RNG 452 changing to NRM 452 GIS in NRM)	
SOIL 410	Soils and Land Use	
SOC 405	Community Development	
ZOO 476	Wildlife Ecology and Management	

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.

Range Science

www.ag.ndsu.edu/range

Range Science is a unique program that blends ecology and management for the purpose of sustaining rangelands. Rangelands are important for the diverse array of products and services they provide, including livestock production, wildlife habitat, clean air and water, and recreation to name a few. Rangeland ecosystems comprise over 40% of the earth's land and include grasslands, savannahs, shrublands, deserts, alpine meadows, marshes and wetlands. Rangelands are comprised mainly of native grasses, forbs, and shrubs which are extremely productive and rich in biodiversity.

Just as rangeland ecosystems are diverse, so too are the careers available in rangeland management. Professional career options for rangeland managers are in private and public land management, educators, ranching, wildlife and fisheries, hydrology and economics, scientists, and consultants. The majority of graduates in Range Science find employment with consulting firms, private industry, non-profit organizations, and state and federal agencies. Many of the state and federal agency jobs are as range conservationists with the USDA Forest Service and Natural Resource Conservation Service; USDI Bureau of Land Management, U.S. Fish and Wildlife Service and National Park Service; Bureau of Indian Affairs; and state agencies that include State Land Departments, State Health Departments and universities. Students in the Range Science program will take courses in animal sciences, biology, botany, chemistry, ecology, economics, natural resources management, plant sciences, range science, statistics, wildlife management, zoology, as well as the requirements of general education.

Major Requirements

Major: Range Science

Degree Type: B.S.

Required Degree Credits to Graduate: 132

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
PLSC 110	World Food Crops	3
PLSC 315	Genetics	3

Humanities & Fine Arts (A): Select from current general education list

6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
Select from current general education courses		3

Wellness (W): Select from current general education courses

2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 201	Principles of Microeconomics	3
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Total Credits **40**

Major Requirements

General Education Requirements **40**

Required Courses for Range Science

AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 114	Introduction to Animal Sciences	3
ANSC 123	Feeds and Feeding	3
or ANSC 220	Livestock Production	
RNG 336	Introduction to Range Management	3
RNG 450	Range Plants	3
RNG 452	Geographic Information Systems in Range Survey	3
RNG 453	Rangeland Resources Watershed Management	3
or RNG 454	Wetland Resources Management	
RNG 456	Range Habitat Management	3
RNG 458	Grazing Ecology	3
RNG 460	Plant Ecology	3
RNG 462	Natural Resource and Rangeland Planning	3
RNG 491	Seminar	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
BOT 380	Plant Physiology	3
CHEM 122	General Chemistry II	3
CHEM 140	Organic Chemical Concepts and Applications	1

CHEM 260	Elements of Biochemistry	4
MATH 103	College Algebra (or higher level)	3
Select one of the following:		2-3
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 320	Principles of Forage Production	
PLSC 323	Principles of Weed Science	
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
SOIL 210	Introduction to Soil Science	3
SOIL 217	Introduction to Meteorology & Climatology	3
Select one of the following:		3
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 444	Soil Genesis and Survey	3
ZOO 475 or ZOO 476	Conservation Biology Wildlife Ecology and Management	3
Degree Electives: Potential of a minimum of 17-18 credits to reach 132.		17
Total Credits		132

Minor Requirements

Range Science Minor

Minor Requirements

Required Credits: 16

Required Courses

RNG 225	Natural Resource & Agro-Ecosystems	3
RNG 336	Introduction to Range Management	3
RNG 450	Range Plants	3
Select one of the following:		3
RNG 452	Geographic Information Systems in Range Survey	
RNG 453	Rangeland Resources Watershed Management	
RNG 460	Plant Ecology	
RNG 456 or RNG 458	Range Habitat Management Grazing Ecology	3
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.

Soil Science

www.ndsu.edu/soils

Soil Science is a field-oriented discipline that defines, investigates, and utilizes one of the most important of our natural resources. All terrestrial life depends upon the soil for food and clean water. Knowledge of soil science is critical to address environmental problems, such as wetland protection, habitat restoration, and waste disposal, and it is vital to ensure sustainability of agricultural and forest products. Soil expertise is also essential in the emerging fields of urban and sustainable agriculture. Soils are complex and constantly evolving natural systems, hence the curriculum accentuates physical, biological, and earth sciences. A soil science degree prepares a student with the training to enter careers in both traditional agriculture and the environmental sectors, including: environmental consulting, soil conservation and resource management, production agriculture, and state and federal research and regulatory agencies.

Major Requirements

Major: Soil Science

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing: Select one of the following:		3
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
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CHEM 122	General Chemistry II	3
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PLSC 110	World Food Crops	3
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):

PLSC 110	World Food Crops	3
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Total Credits		40
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Major Requirements

General Education Requirements		40
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Required Courses for Soil Science

AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
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GEOG 455	Introduction to Geographic Information Systems	4
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or RNG 452	Geographic Information Systems in Range Survey	
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PLSC 225	Principles of Crop Production	3
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or RNG 336	Introduction to Range Management	
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SOIL 210	Introduction to Soil Science	3
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SOIL 217	Introduction to Meteorology & Climatology	3
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SOIL 264	Natural Resource Management Systems	3
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SOIL 322	Soil Fertility and Fertilizers	3
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SOIL 351	Soil Ecology	3
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SOIL 410	Soils and Land Use	3
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SOIL 433	Soil Physics	3
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SOIL 444	Soil Genesis and Survey	3
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SOIL 462	Natural Resource and Rangeland Planning	3
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Supporting Courses

BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
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BIOL 151 & 151L or PHYS 212 & 212L	General Biology II and General Biology II Laboratory College Physics II and College Physics II Laboratory	4
BOT 380	Plant Physiology	3
CHEM 122L	General Chemistry II Laboratory	1
Select one of the following:		3-5
CHEM 240	Survey of Organic Chemistry	
CHEM 260	Elements of Biochemistry	
CHEM 341	Organic Chemistry I	
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
MATH 103	College Algebra	3
MATH 105	Trigonometry	3
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Agriculture Electives: Select 9 credits of agriculture electives		9
Degree Electives: Potential of 10 credits to reach 128.		10
Total Credits		128

Minor Requirements

Soil Science Minor

Minor Requirements

Required Credits: 18

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 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.

Department of Plant Sciences

www.ag.ndsu.edu/plantsciences

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. The field of horticulture supplies fruit, vegetables, trees, and flowers while turfgrass management is responsible for enhancing sport fields and recreational areas for many uses. 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, Horticulture, and Sports and Urban Turfgrass Management. Within these majors multiple curriculum options are available to refine a student's career path.

Crop and Weed Sciences (p. 126)

Food Science (p. 129)

Horticulture (p. 131)

Sports and Urban Turfgrass Management (p. 136)

Crop and Weed Sciences

Crop and Weed Sciences Major

Instruction in crop and weed sciences includes field and forage crop production and management, weed science, general and plant genetics, plant breeding, and biotechnology. The study of botany and other plant sciences, entomology, plant pathology, and soil science is basic or related to crop and weed sciences. Students may obtain either a major or minor. The Crop and Weed Sciences major or minor is intended for general use in sales, research, and technical services (crop consultant) of agribusinesses involved in seed, chemical, and other plant production, protection, and management aspects; in natural resources conservation service; by those interested in production agriculture; or as a prerequisite for graduate study. For more details on M.S. and Ph.D. degrees, see the Graduate School Bulletin (p. 573).

Curriculum Options

Students select one of the following options within Crop and Weed Sciences:

- **Agronomy:** This option is for students most interested in production agriculture. This is the most popular option with students and provides the most flexibility of course selection. Completing the basic crop and weed sciences curriculum fulfills this option.
- **Biotechnology:** This option is intended for students who wish to work in the biotechnology industry or pursue graduate study in the crop biotechnology area. Students interested in biotechnology also may pursue the interdisciplinary Biotechnology major (see Interdisciplinary Programs (p. 548) section).
- **Science:** This option is intended for students who are interested in graduate studies and want more basic science courses as a foundation for graduate studies.
- **Weed Science:** This option is intended for students interested in crop consulting, weed science, or integrated pest management. Additional courses in pest management are required to provide exposure to common issues encountered in these careers and practice in diagnosis and resolution.

Special Opportunities

Agronomy Club: The Agronomy Club meets twice each month. Members join in campus and community activities, arrange speakers on agricultural topics, and participate in meetings and contests at the regional and national levels. The club also coordinates tours to local agribusinesses to gain a better perspective of career opportunities. Students with an interest in agriculture are encouraged to attend, regardless of chosen major.

Crop and Weed Sciences Minor

Students may minor in Crop and Weed Sciences by selecting a total of 18 credits of study in crop and weed sciences or closely related fields.

Major Requirements

Major: Crop & Weed Sciences

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
PLSC 110	World Food Crops	3
CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
CHEM 122	General Chemistry II	3
Humanities & Fine Arts (A): Select from current general education list		
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
Select from current general education courses		3
Wellness (W): Select from current general education list		
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
PLSC 110	World Food Crops	

Total Credits **40**

Major Requirements

General Education Requirements 40

Required Courses for Crop & Weed Sciences

AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
Select one of the following:		4
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	
BOT 372	Structure and Diversity of Plants and Fungi	
CHEM 122L	General Chemistry II Laboratory	1
ENT 350	General Entomology	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	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

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.

Degree Requirements: Potential of 28 credits to reach 128. 28

Total Credits **128**

Agronomy Option - 19-20 Credits

For students interested in production agriculture; this option provides the most flexibility in course selection.

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	Plant Physiology	3
CHEM 240 or CHEM 260 or BOT 460	Survey of Organic Chemistry Elements of Biochemistry Plant Ecology	3-4
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**

Biotechnology Option - 19-21 Credits

For students who wish to work in the biotechnology industry or pursue graduate study in crop biotechnology.

BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BOT 380	Plant Physiology	3
MATH 105 or MATH 146	Trigonometry Applied Calculus I	3-4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PLSC 453 or PLSC 431	Advanced Weed Science Intermediate Genetics	2-3
PLSC 484	Plant Tissue Culture and Biotechnology	3

Total Credits **19-21**

Science Option - 30 Credits

For students interested in advanced study and want more foundation studies.

MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	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**

Weed Science Option - 27-28 Credits

For students interested in crop consulting, weed science, and plant protection areas.

AGEC 375 or AGECE 484 or BUSN 431 or SAFE 452	Applied Agricultural Law Agricultural Policy Business Law I-Contracts, Property and Torts Food Laws and Regulations	3
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
BOT 380	Plant Physiology	3
CHEM 240 or CHEM 260	Survey of Organic Chemistry Elements of Biochemistry	3-4

MATH 103	College Algebra (or higher level)	3
PLSC 433	Weed Biology and Ecology	2
PLSC 453	Advanced Weed Science	2
PLSC 300-400		2
PPTH 454	Diseases Of Field and Forage Crops	3
SOIL 322	Soil Fertility and Fertilizers	3

Total Credits**27-28****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**Crop & Weed Science Minor****Minor Requirements****Required Credits: 18****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.

Food Sciencewww.ag.ndsu.edu/foodscience**Food Science Major**

The Food Science major is offered through the Department of Plant Sciences in the College of Agriculture, Food Systems, and Natural Resources. It is designed to prepare students for a career in the food industry, the "world's largest industry," which is responsible for feeding the world.

The program is structured to develop an understanding of the nature, properties, and characteristics of foods through foundation courses in biochemistry, chemistry, microbiology, physics, and other related sciences. Applications include the study of food safety, processing, preservation, sanitation, storage, and marketing of foods. The analysis and microbiological and biochemical characterization of food products are also studied. Additionally, elective courses in economics and business administration are available to students intending to enter a management career.

Note: Transfer credits in food science from other institutions must have grades of 'C' or better to be accepted for the food science program at NDSU. The Institute of Food Technologists (IFT) approves the curriculum in the food science program. Students majoring in food science, therefore, are eligible to compete for the prestigious IFT scholarships.

The program also provides the opportunity to gain industrial experience during undergraduate study by means of industry internships. Upon completion of the program, graduates will be able to recognize, critically analyze, and solve problems realistically in both industrial and academic environments.

Major Requirements

Major: Food Science

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course Upper Level Writing: Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
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CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
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CSCI 114 or CSCI 116	Microcomputer Packages Business Use of Computers	3-4
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
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Select one course from the current general education list		3
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Wellness (W):

HNES 250	Nutrition Science	3
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3

Total Credits		42
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Major Requirements

General Education Requirements		40
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Required Core Courses for Food Science

AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
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ABEN 263	Biological Materials Processing	3
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ANSC 340	Principles of Meat Science	3
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CFS 210 or CFS 200	Introduction to Food Science and Technology Introduction to Food Systems	2-3
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CFS 370	Food Processing I	3
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CFS 450	Cereal Technology	3
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MICR 453	Food Microbiology	3
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CFS 460	Food Chemistry	3
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CFS 461	Food Chemistry Laboratory	1
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CFS 464	Food Analysis	3
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CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CFS 474	Sensory Science of Foods	2
CFS 480	Food Product Development (Capstone)	3
SAFE/CFS/AGEC 452	Food Laws and Regulations	3

Supporting Courses

Select one of the following:		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
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4

Degree Requirements: Potential for a minimum of 25 credits (24 if CFS 200 was taken) to reach 128. 25

Total Credits

128-129

Degree Requirements and Notes:

- A 2.00 cumulative GPA is required for graduation and to remain in program.

Horticulture

Instruction and study in horticulture is focused on fruits, vegetables, and woody and herbaceous landscape plants, including propagation, production, culture, marketing, processing, and utilization. Horticulture encompasses the design and planting for landscapes, parks, highways, and public facilities, including interiorscapes, in rural, suburban, and urban areas. It includes skills for management of nursery, garden center, greenhouse, seed, fruit, vegetable, biotechnology, and specialty crop enterprises, as well as floral design and flower shops.

The Horticulture major is a four-year curriculum leading to the B.S. degree. Students also may minor in Horticulture. Prospective students should consult with horticulture faculty regarding programs and options so their educational needs may best be fulfilled. Master of Science and Ph.D. degree programs also are available. For more complete details, see the Graduate Bulletin (p. 573).

Curriculum Options

Horticulture majors may select one or more options of study. All of the requirements for the major and the supporting disciplines must be met to complete any horticulture option. Students may select from the following five options:

- **Horticulture Biotechnology:** This option is for students who plan to engage in laboratory research or further their education in the biotechnology of horticultural crops.
- **Horticulture Science:** This option is for students who plan to continue formal graduate school education leading to careers in research, teaching, and extension.
- **Landscape Design:** This option is for students interested in planning, designing, and installing landscape plantings for functional and aesthetic purposes (a 19-credit minor in landscape architecture is required).
- **Production Business:** This option is for students who wish to grow, market, and process horticultural crops, for example, nursery and/or greenhouse landscape, fruit, and vegetable crops.
- **Urban Forestry and Parks:** This option is for students who desire a career in the management of urban forests and park-like areas, including arboreta and botanic gardens. It also includes maintenance of residential landscapes.

Special Opportunities

Pre-Forestry: A student who desires to major in forestry may select a two-year pre-forestry curriculum. However, the forestry student must transfer to another institution that offers a Forestry program to complete degree requirements.

Horticulture and Forestry Club: This club meets twice each month. Members take field trips to botanical gardens, arboreta, trade shows, parks and other horticultural sites. They also are actively involved in growing and marketing flowers and foliage plants, regional and national judging contests, flower shows, and horticulture science and education programs.

Major Requirements

Major: Horticulture

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing: Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
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CHEM 122	General Chemistry II	3
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CSCI 114	Microcomputer Packages	3-4
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or CSCI 116	Business Use of Computers	
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):		
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ECON 201	Principles of Microeconomics	3
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or ECON 202	Principles of Macroeconomics	
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Select course from current general education list		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):		
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ECON 201	Principles of Microeconomics	3
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Total Credits		40
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Major Requirements

General Education Requirements		40
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Required Courses for Horticulture		
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AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
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BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
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ENT 350	General Entomology	3
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PLSC 210	Horticulture Science	3
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PLSC 211	Horticulture Science Lab	1
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PLSC 315	Genetics	3
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PLSC 355	Woody Landscape Plants	3
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PLSC 457	Horticulture and Turfgrass Systems (Capstone)	3
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PLSC 491	Seminar	1
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PPTH 324	Introductory Plant Pathology	3
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Options: Select one of the five options listed below.

38-53

Students must select one option of most interest. The standard option for this major is Production-Business. Student who wish to declare an option other than the standard option must officially declare that option with the Office of Registration and Records.

Degree Requirements: Potential of a minimum of 25 credits to reach 128.

25

Total Credits**128-143****Production-Business Option - 47 Credits****Standard option for the major of horticulture.**

ACCT 102	Fundamentals of Accounting	3
BOT 372	Structure and Diversity of Plants and Fungi	4
BOT 380	Plant Physiology	3
MGMT 320	Foundations of Management	3
MGMT 450	Human Resource Management	3
MATH 103	College Algebra	3
PLSC 315L	Genetics Laboratory	1
PLSC 323	Principles of Weed Science	3
PLSC 360	Horticultural Food Crops	4
PLSC 368	Plant Propagation	3
PLSC 412	Nursery Production and Management	3
PLSC 422	Greenhouse Production and Management	3
PLSC 486	Applied Crop Physiology	3
PPTH 455	Plant Disease Management	3
or PPTH 457	Landscape Plant Pathology	
SOIL 210	Introduction to Soil Science	3

Plant Science Electives: Select one of the following:

2

PLSC 362	Potato Science	
PLSC 365	Herbaceous Landscape Plants	
PLSC 375	Turfgrass Management	
PLSC 465	Advanced Landscape Plants	
PLSC 484	Plant Tissue Culture and Biotechnology	
PLSC 485	Arboriculture Science	
PLSC 296/496	Field Experience	

Total Credits**47****Horticulture Biotechnology Option - 53 Credits**

This option also requires the completion of the Biotechnology minor.

BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 474	Methods of Recombinant DNA Technology	3
BOT 372	Structure and Diversity of Plants and Fungi	4
BOT 380	Plant Physiology	3
CHEM 122L	General Chemistry II Laboratory	1
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
MATH 146	Applied Calculus I	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
PLSC 315L	Genetics Laboratory	1
PLSC 360	Horticultural Food Crops	4
PLSC 368	Plant Propagation	3

PLSC 484	Plant Tissue Culture and Biotechnology	3
PLSC 486	Applied Crop Physiology	3
MATH 103	College Algebra (or higher level)	3
Plant Science Electives: Select 4 credits from the following:		4
PLSC 296/496	Field Experience	
PLSC 444	Applied Plant Breeding and Research Methods	
PLSC Elective Course	No more than 2 credits of co-op allowed	

Total Credits**53****Horticulture Science Option - 50 Credits**

BOT 372	Structure and Diversity of Plants and Fungi	4
BOT 380	Plant Physiology	3
CHEM 122L	General Chemistry II Laboratory	1
CHEM 260	Elements of Biochemistry	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
MATH 103	College Algebra (or higher based on math placement)	3
MATH 146	Applied Calculus I	4
PHYS 120	Fundamentals of Physics	3
PLSC 315L	Genetics Laboratory	1
PLSC 323	Principles of Weed Science	3
PLSC 360	Horticultural Food Crops	4
PLSC 368	Plant Propagation	3
PLSC 484	Plant Tissue Culture and Biotechnology	3
PLSC 486	Applied Crop Physiology	3
SOIL 210	Introduction to Soil Science	3
Plant Science Electives: Select 4 credit from the following:		4
PLSC 296/496	Field Experience	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC 444	Applied Plant Breeding and Research Methods	
PLSC	Elective	

Total Credits**50****Landscape Design Option - 38 Credits**

This option also requires the completion of the Landscape Architecture minor.

BOT 380	Plant Physiology	3
BOT 460	Plant Ecology	3
BUSN 431	Business Law I-Contracts, Property and Torts	3
MATH 103	College Algebra	3
PLSC 177	Floral Design I	2
PLSC 323	Principles of Weed Science	3
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 365	Herbaceous Landscape Plants	2
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	4
PLSC 465	Advanced Landscape Plants	2
PLSC 485	Arboriculture Science	3
PPTH 457	Landscape Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
Plant Science Electives: Select 2 credits from the following:		2
PLSC 296/496	Field Experience	

PLSC 368	Plant Propagation	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC 486	Applied Crop Physiology	
PLSC	Elective	

Total Credits **38**

Urban Forestry & Park Option - 51 Credits

BOT 372	Structure and Diversity of Plants and Fungi	4
BOT 380	Plant Physiology	3
BOT 460	Plant Ecology	3
MGMT 320	Foundations of Management	3
HNES 426	Sport Administration	3
MATH 103	College Algebra	3
NRM 150	Natural Resource Management Orientation	1
PLSC 219	Introduction to Prairie & Community Forestry	2
PLSC 315L	Genetics Laboratory	1
PLSC 323	Principles of Weed Science	3
PLSC 365	Herbaceous Landscape Plants	2
PLSC 375	Turfgrass Management	3
PLSC 465	Advanced Landscape Plants	2
PLSC 485	Arboriculture Science	3
PLSC 486	Applied Crop Physiology	3
POLS 360	Principles of Public Administration	3
PPTH 457	Landscape Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
Plant Science Electives: Select 3 credits from the following:		3
PLSC 296/496	Field Experience	
PLSC 368	Plant Propagation	
PLSC 412	Nursery Production and Management	
PLSC 422	Greenhouse Production and Management	
PLSC	Elective	

Total Credits **51**

Degree Requirements and Notes

- No more than 6 credits may be co-op.

Minor Requirements

Horticulture Minor

Minor Requirements

Required Credits: 18

Required Courses

PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1

Elective Courses: Select 8 credits from the following: **8**

PLSC 355	Woody Landscape Plants	
PLSC 360	Horticultural Food Crops	
PLSC 365	Herbaceous Landscape Plants	
PLSC 368	Plant Propagation	
PLSC 465	Advanced Landscape Plants	

Select 6 credits from the courses listed below: **6**

Any PLSC 300-400 level courses or any of the courses listed below are required to obtain the minimum of 18 credits.

PLSC 300-400 level	
ENT 350	General Entomology
PPTH 324	Introductory Plant Pathology
SOIL 210	Introduction to Soil Science

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.

Sports and Urban Turfgrass Management**Sports and Urban Turfgrass Management Major**

The Sports and Urban Turfgrass Management program focuses on the science and technology for the management of quality turf in such areas as golf courses, sports facilities, parks, and home lawns. A graduate should be competent in grass physiology, soil science, proper irrigation practices, pest control, budgeting of resources, and personnel management. Graduates may work in the turf industry, which encompasses not only turf managers, but also the production of seed, sod or other turfgrass materials, manufacturing and marketing of products for turf management, business management, manpower development, consulting, and other services.

Students have the opportunity to minor in other programs of interest.

Turf Club: The goals of the Turf Club are to provide students with opportunities to share information, connect with the turf industry, gain real world experience, and broaden their knowledge. The club organizes field trips, topic discussions, and presentations by guest speakers. Other activities include attending regional and national turf conferences, community service, and fundraising.

Major Requirements**Major: Sports & Urban Turfgrass Management**

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements**First Year Experience (F):**

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper level Writing: Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):		10
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This area will be satisfied with courses prescribed by the major.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B)		
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ECON 201	Principles of Microeconomics	3
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or ECON 202	Principles of Macroeconomics	
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Select from current general education courses		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):		
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ECON 201	Principles of Microeconomics	3
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or ECON 202	Principles of Macroeconomics	
Total Credits		40

Major Requirements

General Education Requirements		40
Required Courses for Sports & Urban Turf Mgmt		
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
PLSC 323	Principles of Weed Science	3
PLSC 341	Landscape Bidding, Contracting and Operations	2
PLSC 375 & 375L	Turfgrass Management and Turfgrass Management Laboratory	4
PLSC 381	Sports Turf Operations	3
PLSC 457	Horticulture and Turfgrass Systems	3
PLSC 468	Landscape Irrigation Design	2
PLSC 469	Landscape Irrigation Installation and Management	2
PLSC 491	Seminar	1
PLSC 496	Field Experience	2
Supporting Courses		
ACCT 102	Fundamentals of Accounting	3
AGEC 242	Introduction to Agricultural Management	3
or AGECE 244	Agricultural Marketing	
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BOT 380	Plant Physiology	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
ENT 350	General Entomology	3
MATH 103	College Algebra (or higher level)	3
PPTH 324	Introductory Plant Pathology	3
PPTH 457	Landscape Plant Pathology	3
SOIL 210	Introduction to Soil Science	3
SOIL 322	Soil Fertility and Fertilizers	3
Plant Science Electives: Select 5 credits from the following:		5
PLSC 215	Weed Identification	
PLSC 219	Introduction to Prairie & Community Forestry	
PLSC 296	Field Experience	
PLSC 355	Woody Landscape Plants	
PLSC 365	Herbaceous Landscape Plants	
PLSC 368	Plant Propagation	
PLSC 480	Advanced Turfgrass Topics	
PLSC 485	Arboriculture Science	
PLSC 486	Applied Crop Physiology	
Degree Electives: Potential of 27 credits to reach 128.		27
Total Credits		128

Degree Requirements and Notes

- Suggested minors to supplement this major are Business Administration or Landscape Architecture.
- The following courses are suggested as options should additional coursework be necessary to achieve the minimum 128 credits required for degree completion: ADHM 140 Introduction to the Hospitality Industry, ADHM 141 Tourism and Travel Management, ADHM 151 Design Fundamentals,

ASM 373 Tractors & Power Units, ASM 374 Power Units Laboratory, CE 212 Civil Engineering Graphic Communications, HNES 112 Activity II, PHYS 211 College Physics I & PHYS 211L College Physics I Laboratory, PHYS 212 College Physics II & PHYS 212L College Physics II Laboratory, PLSC 150 Introduction to Horticulture Therapy, AND SOIL 217 Introduction to Meteorology & Climatology.

Department of Veterinary and Microbiological Sciences

www.ndsu.edu/vetandmicro

This department offers instruction in microbiology, including courses in general microbiology, pathogenic microbiology, parasitology, virology, immunology, food microbiology, microbial physiology and bacterial genetics.

Biotechnology (p. 138)

Microbiology (p. 141)

Pre-Veterinary Medicine (p. 143)

Vaccinology Minor (p. 144)

Biotechnology

Biotechnology

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. The methodologies 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 protoplasts, and the regeneration of whole plants from single cells.

Biotechnology also is concerned with the large-scale fermentation processes that utilize some of these novel organisms for the production of pharmaceuticals, diagnostic tests for diseases, feed additives, enzymes, and hormones.

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. 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 are all examples of successful biotechnology.

The Biotechnology program is offered in either the College of Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>) or the College of Science and Mathematics (<https://www.ndsu.edu/scimath>) and leads to the Bachelor of Science degree or Bachelor of Arts degree (College of Science and Mathematics only). The curriculum is designed to provide students with knowledge and experience in both basic and applied sciences. Students have an opportunity to work with scientists in various areas including, animal science, biochemistry, biology, botany, chemistry, horticulture, microbiology, pharmaceutical sciences, plant pathology, plant science, and zoology. Faculty in each of the cooperating life-science departments has been identified to serve as advisers and research mentors for students who select the biotechnology major. Graduates of this program have excellent opportunities for employment in the biotechnology industry or for graduate education.

Students majoring in biotechnology are required to perform a research project in the laboratory of a faculty member/scientist, and to prepare a senior thesis describing their research project. A 2.50 institutional grade-point average is required to graduate from the program.

Biotechnology Minor

A minor in biotechnology requires satisfactory completion of 21 credits in the following courses. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Biotechnology

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F)		
AGRI/UNIV 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C)		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3

Upper Division Writing: Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 459	Researching and Writing Grants and Proposal	
MICR 354	Scientific Writing	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S)		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Select one sequence from the following:		4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from the current general education list		6
Wellness (W): Select from the current general education list		2
Cultural Diversity (D): Select from the current general education list		
Global Perspectives (G): Select from the current general education list		
Total Credits		42

Major requirements

Code	Title	Credits
General Education Requirements		40
Biotechnology Requirements		
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 465	Principles of Physical Chemistry and Biophysics	4
BIOC 474	Methods of Recombinant DNA Technology	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
MICR 482	Bacterial Genetics & Phage	3
MICR 491	Seminar (Biotechnology)	1-5
MICR 494	Individual Study (Senior Research)	2-4
MICR 494	Individual Study (Senior Thesis)	1
Supporting Requirements		
AGRI 150	Agriculture Orientation (Applies to students earning the degree from the CoAFSNR only; Students transferring in 24 or more credits do not need to take AGRI 150)	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 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3

CSCI 114 or CSCI 122	Microcomputer Packages Visual BASIC	3
Select one from the following:		8
MATH 146 & MATH 147	Applied Calculus I and Applied Calculus II	
MATH 165 & MATH 166	Calculus I and Calculus II	
Select one from the following:		4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Major Elective in Physiology: Select 3 credits from the following:		3
BOT 380	Plant Physiology	
ZOO 460	Animal Physiology	
MICR 480	Bacterial Physiology	
Major Elective in Biotechnology Technique: Select 4-6 credits from the following:		4-6
BIOC 473	Methods of Biochemical Research	
BIOC 487	Molecular Biology of Gene Expression	
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.		
Degree Requirements: Potential of 7 credits to reach 128		7

Total Credits**128-136****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**Biotechnology Minor****Required Credits: 21**

Code	Title	Credits
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
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 form the following:

6

BOT 380	Plant Physiology	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
MICR 482	Bacterial Genetics & Phage	
PPTH 324	Introductory Plant Pathology	
ZOO 370	Cell Biology	
ZOO 460	Animal Physiology	

Total Credits**21****Minor Requirements and Notes**

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

Microbiology

Microbiology is a fundamental biological science which offers a variety of challenges and opportunities. Microbiologists have made some of the most important scientific discoveries in this century. 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 illustrate how microbes affect human and animal health, our environment, food safety, food technology, and the biotechnology industry. In recent years, the field of microbiology has had a major impact upon virtually all other scientific disciplines. For this reason, even students who choose to major in other fields may benefit from a minor in microbiology.

Students majoring in microbiology are well prepared to enter graduate school, veterinary school, and medical school, or to establish careers in food or pharmaceutical industries, hospitals, public health agencies, universities, research laboratories, and other biomedical industries.

Major Requirements

Major: Microbiology

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
MICR 354	Scientific Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (or higher)	4
CHEM 122	General Chemistry II (or higher)	3
PHYS 211	College Physics I (or higher)	3

Humanities & Fine Arts (A): Select from current general education list 6**Social & Behavioral Sciences (B): Select from current general education list** 6**Wellness (W): Select from current general education list** 2**Cultural Diversity (D): Select from current general education list****Global Perspectives (G): Select from current general education list****Total Credits****40**

Major Requirements

A grade of 'C' or better is required for the Microbiology Core and Elective Credit requirements.

General Education Requirements**40**

Required Core Courses for Microbiology

MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 352	General Microbiology II	3
MICR 450 & 450L	Infectious Disease Pathogenesis and Infectious Disease Pathogenesis Laboratory	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
MICR 475	Animal Virology	3
MICR 480	Bacterial Physiology	3
MICR 482	Bacterial Genetics & Phage	3
MICR 486	Capstone Experience in Microbiology	3

Elective Credit: Select 6 credits from the following: 6

BIOC 487	Molecular Biology of Gene Expression	
MICR 352L	General Microbiology Lab II	
MICR 463	Clinical Parasitology	
MICR 379	Study Tour Abroad	
MICR 445	Animal Cell Culture Techniques	
MICR 452	Microbial Ecology	
MICR 453	Food Microbiology	
MICR 472	Clinical Immunology	
MICR 474	Epidemiology	
MLS 435	Hematology	
PPTH 460	Fungal Biology	

No more than 3 of the elective credits may come from the following:

MICR 491	Seminar	
MICR 494	Individual Study	
MICR 496	Field Experience	
MICR 499	Special Topics	
MICR 370-MICR 399		
MICR 491-MICR 499		

Related Requirements

AGRI/ANSC/VETS 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 122L	General Chemistry II Laboratory	1
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3

Select one of the following or higher level math: 4-6

MATH 146	Applied Calculus I	
MATH 103 & MATH 105	College Algebra and Trigonometry	
MATH 107	Precalculus	
PHYS 211L	College Physics I Laboratory (or higher)	1
PHYS 212 & 212L	College Physics II and College Physics II Laboratory (or higher)	4
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
BIOL/BOT/ZOO	Elective	3

Degree Requirements: Potential of 16-18 credits to reach 128.

16-18

Total Credits**128**

Degree Requirements and Notes

- A cumulative 2.50 GPA is required for graduation.

Minor Requirements

Microbiology Minor

Minor Requirements

Required Credits: 16

Required Courses

MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
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Elective Courses: Select 11 credits from the following: 11

No more than 3 of the elective credits may come from MICR 490-499.

BIOC 487	Molecular Biology of Gene Expression
MLS 435	Hematology
MICR 379	Study Tour Abroad
MICR 445	Animal Cell Culture Techniques
MICR 452	Microbial Ecology
MICR 453	Food Microbiology
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology 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	Animal Virology
MICR 480	Bacterial Physiology
MICR 481	Microbial Genomics with Computational Laboratory
MICR 482	Bacterial Genetics & Phage
MICR 491	Seminar
MICR 494	Individual Study
MICR 496	Field Experience
MICR 499	Special Topics
PPTH 460	Fungal Biology

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.

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. Communication with pre-veterinary

students is facilitated when students are enrolled in the College of Agriculture, Food Systems, and Natural Resources. Visit the VMS, Pre-Veterinary Medicine (<http://www.ndsu.edu/vetandmicro/students/prospective/our-undergrad-programs/pre-vet-medicine>) web site for further information.

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.

Vaccinology

Minor Requirements

Vaccinology Minor

Minor Requirements

Required Credits: 22

BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
MICR 470	Basic Immunology	3
MICR 471 or MICR 445	Immunology and Serology Laboratory Animal Cell Culture Techniques	2
STAT 330	Introductory Statistics	3
PSCI 291	Seminar	1-3
PSCI 400	Vaccinology Research Experience	1
PSCI 491	Seminar	1-5
ZOO 370	Cell Biology	3
Select one of the following courses offered at MSUM:		4
BCBT 420	Introduction to Working in a Reg Biochem & Biotech Industry	
BCBT 425	Introduction to Validation in the Biochem & Biotech Industry	
BCBT 430	Introduction to Quality Assurance and Quality Control in the Biochem & Biotech Industry	
BCBT 469	Biochemistry & Biotechnology Internship	

Total Credits

22-28

Minor Requirements and Notes

- For more information on the Vaccinology minor, contact Dr. Eugene Berry at 701-231-7520 or eugene.berry@ndsu.edu
- A minimum of 8 credits must be taken at NDSU

College of Arts, Humanities & Social Sciences

Kent Sandstrom

Minard 204, 701-231-8338, www.ndsu.edu/ahss

The College of Arts, Humanities and Social Sciences embraces the teaching, research, creative activities and service objectives of NDSU's land grant mission, and the needs of a diverse constituency. The college is committed to:

- Providing its students with the highest quality of preparation in an atmosphere that promotes intellectual rigor, critical inquiry, citizenship, and creative decision-making requisite for personal growth and professional success.
- Encouraging in its faculty exemplary scholarship of teaching, research, and service, leading to significant publications, creative work and performances.
- Invigorating the tradition of outreach through enriching performance, presentation, and cultural understanding. In its vision to realize human potential and achievements, the College of Arts, Humanities and Social Sciences is guided by the qualities of creativity, ethical integrity, and mutual 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.

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.

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. 218).

Interdisciplinary Programs

The College of Arts, Humanities and Social Sciences participates in four interdisciplinary programs on campus. For further information on any of these programs, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Fraud Investigation Minor — Students in this interdisciplinary minor will study the causes of fraud, as well as the detection, investigation, and prevention of fraud.

Gerontology Minor — This program provides students with an integrated understanding of the process of aging, aging services, and the aged in America.

International Studies Major — Students in this secondary major take classes with an international focus.

Women and Gender Studies Major and Minor — The goal of Women and Gender Studies is to examine the contributions of all genders to aspects of society, to explore the intersections of race, class, sexual orientation, age, and physical ability with gender both globally and nationally, to investigate the heritage, challenges and concerns of women and men, and to provide a newer and broader understanding of women and men in all fields.

Graduate Degrees

Master's degrees are offered in Anthropology, Architecture, Emergency Management, English, History, Mass Communication, Music, Political Science, Social Science, Sociology and Speech Communication. Doctoral degrees are offered in Communication, Criminal Justice, Emergency Management, English, History, and Music. For complete details, see the Graduate Bulletin (p. 573).

Teacher Certification

Many of the majors available through the College of Arts, Humanities and Social Sciences 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. However, a Music Education option is offered under the B.Mus. degree in Music within the College of Arts, Humanities and Social Sciences. K-12 certification is available in Music Education. Teacher certification at the secondary level is available in the following areas: English, French, History, Social Science, and Spanish.

To meet requirements of the No Child Left Behind Act of 2001, 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 (<https://www.ndsu.edu/registrar>) for details. Students are encouraged to declare their primary and secondary majors by submitting an online Major Change Form available on the Office of Registration and Records web site.

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.

A minimum of 122 credits of which at least 37 must be at the 300-400 level is required for the B.A. or B.S. degree.

Bachelor of Arts degree requirements include proficiency of one foreign language at the second-year college level. Bachelor of Science degree requirements include completion of an approved minor. For more information on how to fulfill a B.A. requirement using a second language (p. 45), refer to the Academic Policies (p. 32) 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 for additional information on requirements that satisfy the college requirements.

Field Experience Courses

1. 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.

Cooperative Education

Cooperative Education (<https://www.ndsu.edu/career/internshipprogram>), 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. Credit is awarded directly by the Cooperative Education program. A Cooperative Education experience may substantially improve students' employment opportunities after graduation. See Career Center (<https://www.ndsu.edu/career>) for further information.

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.

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:

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, a second major, or a second degree is required.

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 Fine Arts (B.F.A.) Degree - available in Art, Design and Tech Theatre, Musical Theatre, or Performance

Bachelor of Landscape Architecture (B.L.A.) Degree

Bachelor of Music (B.Mus.)

Interdisciplinary Programs

The following programs are interdisciplinary and are integrated with more than one college/departments within the University:

Fraud Investigation (p. 555)

Gerontology (p. 199)

Great Plains Institute of Food Safety (p. 196)

Women and Gender Studies (p. 256)

International Studies (p. 556) (Available as a secondary major only.)

Faculty

- Aly Ahmed, Bakr, Assistant Professor of Architecture and Landscape 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, Lecturer in English, Ph.D., 2011, The Graduate Center of the City University of New York
- Archbold, Carol A., Professor of Criminal Justice, Ph.D., 2002, University of Nebraska-Omaha
- Avery-Natale, Edward, Assistant Professor of Sociology, Ph.D., 2012, Temple University
- Axelson, Rick, Associate Professor of Sociology and Director of the Center for Social Research, Ph.D., 2003, University of Arizona
- Baggett, Ashley, Assistant Professor of History, Ph.D., 2014, Louisiana State University
- Barnhouse, Mark, Associate Professor of Practice of Architecture and Landscape 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., Associate Professor of Communication, Ph.D., 2008, University of Kansas
- Benton, Bradley, Assistant Professor of History, Ph.D., 2012, University of California, Los Angeles
- Bergeson, Brady, Lecturer in English, M.F.A., 2006, Hamline University
- Bertolini, Alison Graham, Assistant Professor of English and Women and Gender Studies, Ph.D., 2009, Louisiana State University
- Bertolini, C. David, Professor and Chair of Architecture and Landscape Architecture, Ph.D., 2008, Temple University
- Birmingham, Elizabeth, Professor of English, Associate Dean, College of Arts, Humanities and Social Sciences, Ph.D., 2000, Iowa State University
- Bishop, Carol K., Lecturer and Coordinator of Intensive English Language Program, M.A., 1988, University of California, Los Angeles
- Blankenship, Anne, Assistant Professor of Religious Studies, Ph.D., 2012, University of North Carolina at Chapel Hill
- Bonfield, June P., Emerita Professor of English, Ph.D., 1969, University of Texas
- Booker, Darryl, Associate Professor of Architecture and Landscape Architecture, M.Arch., 1979, University of Colorado
- Boonstoppel, Sarah, Assistant Professor of Criminal Justice, Ph.D., 2014, University of Maryland, College Park
- Bovard, Richard W., Emeritus Professor of English, Ph.D., 1973, University of Denver
- Brekke, Jeremy, Associate Professor of Music, D.A., 2004, University of Northern Colorado
- Briggs, Steven, Assistant Professor of Criminal Justice, Ph.D., 2007, University of Nebraska at Omaha
- Brkic, Jovan, Emeritus Professor of Philosophy, Ph.D., 1959, Columbia University
- Bromley, Kimble A., Professor of Visual Arts, M.F.A., 1986, Southern Illinois University
- Brooks, Kevin A., Professor of English; Ph.D., 1997, Iowa State University
- Brown, Muriel J., Emerita Professor of English, Ph.D., 1971, University of Nebraska
- Brunton, Bill B., Emeritus Professor of Anthropology, Ph.D., 1974, Washington State University
- Bumgarner, Jeffrey, Professor of Criminal Justice and Head of the Department of Criminal Justice and Political Science, Ph.D., 2000, University of Minnesota
- Bundy, Sarah, Assistant Professor of in Emergency Management, Ph.D., 2013, North Dakota State University
- Burnett, Ann, Professor of Communication; Director of Women and Gender Studies, Ph.D., 1986, University of Utah
- Burt, Sean, Assistant Professor of History and English, Ph.D., 2011, Texas Christian University
- Cameron, Kelly, Lecturer of English, Ph.D., 2011, Texas Christian University
- Carlson, Natalie Smith, Lecturer in English, M.A., 2010, North Dakota State University
- Cater, A. Catherine, Emerita Professor of English, Ph.D., 1945, University of Michigan
- Caton, Kristina, Lecturer of English, M.A., 2009, North Dakota State University
- Cavins, Jo Wana, Senior Lecturer of English, B.A., 1979, University of Evansville, Indiana
- Christenson, Mike, Associate Professor of Architecture and Landscape Architecture, M.Arch., 1997, University of Minnesota
- Clark, Jeffrey T., Professor of Anthropology; Chair of Sociology and 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
- Cosgrove, William E., Emeritus Professor of English, Ph.D., 1972, University of Iowa
- Cox, John K., Professor of History; Head of History, Philosophy and Religious Studies, Ph.D., 1995, Indiana University
- Crawford, Elizabeth Crisp, Associate Professor of Communication, Ph.D., 2007, University of Tennessee, Knoxville

- Crutchfield, David, Associate Professor of Architecture and Landscape 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
- Disrud, Stephen, Lecturer of Intensive English Language Program, M.A., 2004, North Dakota State University
- Ecker, Elizabeth, Lecturer of English, M.A., 2006, North Dakota State University
- Emanuelson, Pamela E., Assistant Professor of Sociology, Ph.D., 2008, University of South Carolina
- Engler, Mark, Associate Professor of Theatre, M.F.A., 1998, University of Wisconsin-Madison
- Faulkner, Don C., 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, Assistant Professor of Theatre, M.F.A., 2007, Purdue University
- Fischer, Dominic, Assistant Professor of Architecture and 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, B.Arch., 2005, North Dakota State University
- Flood, Anthony, Associate Professor of Philosophy, Ph.D., 2003, University of Oklahoma
- Fricker, Linda M., Senior Lecturer of English; Academic Advisor, C.A.S., 1986, Northern Illinois University
- Froelich, Andrew I., Emeritus Professor of Music, D.M.A., 1988, Michigan State University
- Ge, Yue, Assistant Professor of Emergency Management, Ph.D., 2013, Texas A&M University
- Gleye, Paul, Professor of Architecture and Landscape Architecture, Ph.D., 1983, University of California-Los Angeles
- Goldwyn, Adam, Assistant Professor of English, Ph.D., 2010, Graduate Center of the City University of New York
- Goreham, Gary A., Professor of Sociology;; Ph.D., 1985, South Dakota State University
- Groberg, Kristi A., Associate Professor of Visual Arts, Ph.D., 1999, University of Minnesota
- Grollman, Stephanie, Senior Lecturer of German, Ph.D., 1998, University of Iowa
- Groves, Robert W., Professor of Music, Ph.D., 1981, University of Iowa
- Hageman, Jeanne K., Associate Professor of French, Ph.D., 1991, University of Wisconsin-Madison
- Hanson-Dittmer, Louise, Lecturer of English, M.Ed., 1998, North Dakota State University
- Harvey, Mark, Professor of History, Ph.D., 1986, University of Wyoming
- Hatlen, Vincen, 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, Associate Professor of English, Ph.D., 2001, Southern Illinois University
- Homan, Paul W., Associate Professor of French, Ph.D., 1988, University of Kansas
- Hunt, Elisa, Lecturer in English as a Second Language, M.A., 2000, Ohio University
- 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., Assistant Professor of Emergency Management, Ph.D., 2010, North Dakota State University
- Johnson, Gayle, Lecturer of English, M.A., 1999, North Dakota State University
- Johnson, Sigurd, Associate Professor of Music; Director of Sports 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., 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
- Kang, J. Cecilia, Assistant Professor of Music, D.M.A., 2011, University of Michigan
- Kapplinger, Kent, Professor of Visual Arts, M.F.A., 1991, University of Iowa
- Kelley, Suzzanne, Assistant Professor of Practice, North Dakota Institute for Regional Studies, Ph.D., 2010, North Dakota State University
- Kelly, Gina Aalgaard, Assistant Professor of Sociology, Ph.D., 2007, University of Minnesota
- Kim, Young-Jae, Assistant Professor of Landscape Architecture, Ph.D., 2014, Texas A&M University
- Kirkwood, Matthew J., Landscape Architecture Program Director and Associate Professor of Architecture and Landscape Architecture, M.Des, 1993, Harvard University
- Kirkwood, Meghan, Assistant Professor of Visual Art, M.F.A., 2009, Tulane University
- Kitch, Travis, Lecturer in Anthropology, M.A., 2003, North Dakota State University
- Klenow, Daniel J., Professor and Head of Emergency Management, Ph.D., 1977, University of Notre Dame

- Kloberdanz, Timothy J., Emeritus Professor of Anthropology, Ph.D., 1986, Indiana University
- Koenig, Hardy, Assistant Professor of Theatre, M.F.A., 1994, University of North Carolina at Greensboro
- Krishnan, Ramakrishnan S., Professor of English, Ph.D., 1981, University of Nebraska
- Kost, Jason, Lecturer 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
- Law, Bill, Assistant Director, Fine Arts; Lecturer of Music, M.A., 1994, Minnesota State University Moorhead
- Legatt, Suzanne, Assistant Professor of Practice in Visual Arts; M.F.A., 2006, Utah State University, Logan
- 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., Professor of Communication, Ph.D., 1983, University of Minnesota
- Lodewyk, Richard, Lecturer in Communication, M.S., 2007, North Dakota State University
- Lutgen-Sandvik, Pamela, Associate Professor of Communication, Ph.D. 2005, Arizona State University
- 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 and Landscape Architecture, Ph.D., 1995, University of Florida
- Majdik, Zoltan P., Associate Professor of Communication, Ph.D., 2008, University of Southern California
- Mara, Andrew Flood, Professor of English, Ph.D., 2003, University of New Mexico
- Mara, Miriam O'Kane, Professor of English, Ph.D., 2003, University of New Mexico
- Martens, Steve C., Professor of Architecture and Landscape Architecture, M.Arch., 1988, University of Minnesota
- Matchie, Thomas F., Emeritus Professor of English, Ph.D., 1974, University of Wisconsin
- Maylath, Bruce, Professor of English, Ph.D., 1994, University of Minnesota
- 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
- Meister, Mark A., Professor and Head of Communication Ph.D., 1997, University of Nebraska
- Melby, Benjamin, 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, Assistant Professor of Criminal Justice, Ph.D., 2010, University of Cincinnati
- Nelson, Kjersten R., Assistant 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
- Noone, Katherine, Assistant Professor of Musical Theatre, D.M.A., 2007, North Dakota State University
- O'Connor, Patricia, Emerita Professor of Library Science, M.A.L.S., 1956, College of St. Catherine
- O'Connor, Robert, Emeritus Professor of English, Ph.D., 1979, Bowling Green State University
- Okigbo, Charles, Professor of Communication, Ph.D., 1982, Southern Illinois University
- Olfert, Warren D., Associate 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
- Pace, Chelsea, Assistant Professor of Theatre Arts, M.F.A., 2014, Arizona State University
- Patnode, Matthew A., Associate Professor of Music, D.M.A., 2000, Arizona State University
- Pearson, Carol, Associate 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
- Peirce, Karen, Associate Director of the Center for Writers, Ph.D., 2006, The University of Arizona
- Pemstein, Daniel, Assistant Professor of Political Science, Ph.D., 2010, University of Illinois at Champaign-Urbana
- Pepple, Kathleen, Assistant Professor of Architecture and Landscape Architecture, M.C.R.P., 1991, M.F.A., 1981, North Dakota State University
- Perett, Marcela, Assistant Professor of History, Ph.D., 2009, The Medieval Institute, University of Notre Dame

- Peterson, Larry R., Professor of History, Ph.D., 1978, University of Minnesota
- Platt, Carrie Anne, Associate Professor of Communication, Ph.D., 2008, University of Southern California
- Pull, Mary E., Senior Lecturer of English; 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 and Landscape 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
- Ryan, Anneli, Lecturer in English as a Second Language, M.S., 2012, Minnesota State University Moorhead
- Saar, Cynthia L., Senior Lecturer of French, M.A., 1980, Middlebury College
- Salafia, Matthew, Assistant Professor of Practice and Honors Program Coordinator, Ph.D., 2009, University of Notre Dame
- Sandland, Julie A., Senior Lecturer of English, M.A., 1990, North Dakota State University
- Sandstrom, Kent, Professor of Sociology; Dean, College of Arts, Humanities and Social Sciences; Director, North Dakota Institute for Regional Studies Press, Ph.D., 1994, University of Minnesota
- Sassi, Enrico, Senior Lecturer in English, M.F.A., 1997, University of Alaska, Fairbanks
- Sassi, Kelly, Associate Professor of English, Ph.D., 2008, University of Michigan
- Schwaen, Regin, M.A.A., Associate Professor of Architecture and Landscape Architecture, M.Arch., 1992, Arkitektskolen i Aarhus, Denmark
- Scott, Maureen T., Senior Lecturer of English, M.A., 1989, University of North Dakota
- 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, Assistant Professor of History, Ph.D., 2011, Middle Tennessee State University
- Smith, Leretta, Lecturer in Sociology, Ph.D., 2006, South Dakota State University
- Soria-Dufner, Carmen, Lecturer of Spanish, M.A., 1980, University of Northern Iowa
- Srivastava, Malini, Assistant Professor of Architecture, M.Arch., 1998, University of Minnesota, Minneapolis
- Stichman, Amy J., Associate Professor of Practice in Criminal Justice, Ph.D., 2003, University of Cincinnati
- Stickney, Gwen, Associate Professor of Spanish, Ph.D., 2004, Indiana University, Bloomington
- Strand, Michael J., Professor and Department Head of Visual Arts, M.F.A., 1999, University of Nebraska, Lincoln
- Strandness, Jean, Emerita Professor of English, Ph.D., 1974, Michigan State University
- Sublett, Virginia, Professor of Music, D.M.A., 1997, University of California, San Diego
- Sullivan, Dale L., Professor of English, Ph.D., 1988, Rensselaer Polytechnic Institute
- Swenson, David G., Associate Professor of Visual Arts, M.F.A., 1992, University of Minnesota
- Taggart, Amy Rupiper, Professor of English, Ph.D., 2002, Texas Christian University
- Taylor, Adam P., Lecturer in Philosophy, Ph.D., 2013, SUNY at Buffalo
- Temanson, Kaye, 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
- Totten, Gary, Professor of English; Chair, Department of English, Ph.D., 1998, Ball State University
- Trautwein, Charlotte G., Emerita Professor of Music, M.S., 1968, University of Illinois
- Tunstall, William, Lecturer of English, M.A., 2001, North Dakota State University
- Urness, Cindy, Associate Professor of Architecture and Landscape Architecture and Architecture Program Director, M.Arch., 1988, Pratt Institute
- Varland, Rooth, Associate Professor and Head of Theatre Arts, M.F.A., 1989, Northwestern University
- Venette, Patricia, Academic Advisor and Senior Lecturer of Communication; M.S., 1995, North Dakota State University
- Vorderbruggen, Joan, Assistant Professor of Architecture and Landscape Architecture, M.Arch., 2009, University of Oregon
- Ward, Steve A., Emeritus Professor of English, M.A., 1964, North Dakota State University
- Weber, Christina, Associate Professor of Sociology and Associate Dean, College of Arts, Humanities and Social Sciences, 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, Assistant Professor of Communication, Ph.D., 2008, Michigan State University
- Westerman, David, Assistant Professor of Communication, Ph.D., 2007, Michigan State University

- Whitsel, Christopher, Assistant Professor of Sociology, Ph.D., 2009, Indiana University, Bloomington
- Wicktor, Emily, Assistant Professor of English, Ph.D., 2010, The University of Kansas, Lawrence
- Wischer, Stephen, Associate Professor of Architecture and Landscape Architecture, M.F.A., M. Arch., 2004, University of Calgary
- Wood, Robert A., Emeritus Professor of Political Science, Ph.D., 1983, University of Missouri-Columbia
- Wottrich, Tyler, Assistant Professor of Music, D.M.A., 2013, Stony Brook University
- Yellow Bird, Michael, Professor of Sociology and Director of the Indigenous Tribal Studies Program, Ph.D., 1994, University of Wisconsin, Madison
- Youngs, George A., Emeritus Professor of Emergency Management; Director of Social Science Research Center, Ph.D., 1981, University of Iowa
- Yu, Nan, Associate Professor of Communication, Ph.D., 2009, Penn State University

Department of Architecture and Landscape Architecture

www.ndsu.edu/ala

Facilities

The classrooms, studios, and laboratories are well equipped and every effort is made to keep them abreast of current technology.

Student Societies and Organizations

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 Institute of Architecture Students
- American Society of Landscape Architects

In addition, national professional honor societies have chapters on campus for students with high academic attainments. Eligible students are selected for Tau Sigma Delta from architecture or Sigma Lambda Alpha from landscape architecture. Membership in these societies is a coveted honor and highly regarded in the architectural professions.

Architecture (p. 151)

Landscape Architecture (p. 154)

Architecture

The architect must combine an understanding of society, artistic skill, and technological knowledge to shape places and spaces that enrich human life. Not only do the physical requirements need to be satisfied, but also there must be beauty to engage the human spirit. All of this requires a creative thought process that can balance and organize needs that are quite varied in nature. Clear, responsible, sensitive, and comprehensive thinking is demanded of the architect who is to integrate a wide range of factors into a design that is meaningful. For this reason an architect's education must range from the practical aspects of building construction to the study of environmental, social, and aesthetic issues.

Central to the study of architecture is the sequence of architectural studio courses. Students are assigned architectural problems, which may be hypothetical, realistic, or theoretical, and find their own solutions to them with frequent individual consultations with instructors. As the student progresses, the projects become larger and more complex or the solution becomes more detailed. In this way, knowledge and experience acquired in other classes are brought to bear on the principal responsibility of the architect and the architecture student, that of shaping separate considerations into a single design.

Selective Admission

Admission into the first-year Pre-Architecture Program is open to any student enrolled at NDSU. Transfer students are evaluated on the basis of courses taken and grades received. Upon completion of the first year, a selected number of students are admitted to the second year of the program on the basis of institutional GPA attained and performance in first-year environmental design courses.

The Program

At the end of the third year of study, students may apply to the Master of Architecture degree program. The Bachelor of Science in Architecture is granted after the fourth year of study, and the professional Master of Architecture degree at the end of the fifth year of study. The program is fully accredited by the National Architectural Accrediting Board, and the M.Arch. degree is recognized by the National Council of Architectural Registration Boards as a professional degree.

The total number of credits required for the professional degree is 168, and the bachelor degree requirement is 136.

Accreditation

In the United States, most state 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 U.S. professional degree programs in architecture, 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 preprofessional undergraduate degree in architecture for admission. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

Special Notice

Students who are admitted into the second year of the program will be required to purchase a laptop computer before the beginning of the spring semester. Information on type of computer, software, purchase, and financing arrangements will be distributed to admitted students prior to purchase.

Major Requirements

Major: Architecture

Degree Type: B.S.Arch

Required Degree Credits to Graduate: 136

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 326	Writing in the Design Professions	3
or ENGL 357	Visual Culture and Language	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

PHYS 120	Fundamentals of Physics	3
or PHYS 220	Physics for Designers	

Select from current general education list. 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 list. 7

Humanities & Fine Arts (A): No grades below 'C' allowed for these two courses.

ENVD 101	Introduction to Environmental Design	3
ARCH 321	History and Theory of Architecture I	3

Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology	3
ANTH 111	Introduction to Anthropology	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D):

ANTH 111	Introduction to Anthropology	3
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Global Perspectives (G):

ARCH 321	History and Theory of Architecture I	3
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Total Credits 40

Major Requirements

No grades of 'D' allowed for Major Requirements

General Education Requirements 40

Architecture Requirements

ENVD 130	Drawing for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals	4
ARCH 231	Architectural Drawing	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 322	History 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	4
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	
Elective Requirements		
SOC 110	Introduction to Sociology	3
PHIL 101	Introduction to Philosophy	3
Degree Electives: Potential of 9 credits to reach 136 (3 credits must be non-major).		9

Total Credits**136****Architecture - Graduate Level**

ARCH 763	Programming/Thesis Prep	3
ARCH 781	Professional Practice	3
ARCH 771	Advanced Architectural Design	6
ARCH 772	Design Thesis	8
Select 12 credits from the following: (May be repeated, except for identical course offering)		12
ARCH 721	Non-Western Architectural Traditions	
ARCH 722	Urbanism	
ARCH 723	Historic Preservation	
ARCH 724	Architectural Technology	
ARCH 725	Architecture or the Recent Past	
ARCH 726	Current Architectural Theory	
ARCH 727	Vernacular Architectural Traditions	
ARCH 728	Sociocultural Issues	
ARCH 789	Professional Topics in Architecture	

Total Credits**32****Degree Requirements and Notes**

- NO GRADES OF 'D' ALLOWED FOR ANY MAJOR OR MAJOR ELECTIVE REQUIREMENTS.
- Courses listed on this curriculum guide will lead to both a Bachelor of Science in Architecture degree and to an Masters of Architecture degree.
- 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. If a student receives two consecutive "C" grades in studio, they will not be allowed to advance to the next studio level without retaking one of the previous studios.
- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

First Year			
Fall	Credits	Spring	Credits
ENVD 101	3	ENVD 172 or 130	4-3
ENVD 130 or 172	3-4	ENGL 120	3
ENGL 110	3	COMM 110	3
ARCH 321	3	ARCH 322	3
PHIL 101	3	Quantitative Reasoning Requirement	3
UNIV 189	1	Wellness Requirement	2
		16-17	18-17
Second Year			
Fall	Credits	Spring	Credits
ARCH 271	6	ARCH 272	6
ARCH 231	3	ARCH 232	3
ARCH 233	1	ARCH 344	3
Science/Tech General Education Requirement	3	PSYC 111	3
ARCH 323	3	PHYS 120 or 220	3
		16	18
Third Year			
Fall	Credits	Spring	Credits
ARCH 371	6	ARCH 372	6
ARCH 341	3	ARCH 450	3
ARCH 351	4	ARCH 454	3
ARCH 453	3	ARCH 461	3
Science/Tech General Education Lab Requirement	1	ENGL 326 or 357	3
		17	18
Fourth Year			
Fall	Credits	Spring	Credits
ARCH 471	6	ARCH 472, 474, or 475	6
ARCH 443	3	SOC 110	3
ANTH 111	3	Elective	3
Science/Tech General Education Requirement	3	Elective	3
Elective	3		
		18	15

Total Credits: 136

Landscape Architecture

The Landscape Architecture program is one of approximately 63 accredited programs in the United States. The curriculum is reviewed periodically by the nationally organized Landscape Architecture Accreditation Board and has been fully accredited since 1991.

Landscape architects provide a wide variety of professional services for individual clients, organizations, corporations, and government agencies. They are involved at every phase of the development of a site, from the initial discussion of ideas with the client through the supervision of construction for the project.

Master planning of parks, zoos, golf courses, playgrounds, and recreation areas are familiar projects for landscape architects. They may also design multifunctional areas for urban renewal projects, college campuses, industrial parks, new communities, natural areas, reclaimed lands, and wetlands.

Besides designing sites, landscape architects often select building locations, prepare cost estimates, initiate long-range planning studies, determine utility corridors, and prepare environmental impact statements for future construction. Whether specializing within a large firm of landscape architects or working in a small professional office, the landscape architect is often collaborating with other professionals, such as engineers, city planners, and architects.

Most landscape architects spend some of their time at the drawing board or computer. They also spend many hours in the field, investigating and analyzing potential project sites, developing field notes for design layouts, completing visual surveys, and supervising construction. It is at the computer and drawing board that projects are actually organized and shaped into a creative and imaginative solution. The work and responsibility of each landscape architect depends principally on individual interests and abilities. Opportunities may range from professional practice on a small scale to administration of governmental programs.

Those who plan careers in landscape architecture should be able to work independently, have a capacity for solving technical problems, be artistically inclined, and be willing to learn computer use. They should be prepared to work in the competitive environment of the profession, where great value is placed on leadership and the ability to work effectively with others. The range of interests and knowledge required in the profession of landscape architecture is broad; therefore, the courses required of students include many fields of study options.

Selective Admission

Admission into the first-year Pre-Landscape Architecture program is open to any student enrolled at NDSU. Transfer students are evaluated on the basis of courses taken and grades received. Upon completion of the first year, a selected number of students are admitted to the second year of the program. The basis for selection is institutional GPA and performance in first-year environmental design courses.

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.

Major Requirements

Major: Landscape Architecture

Degree Types: B.S. (Environmental Design) & B.L.A. (Bachelor of Landscape Architecture)

Required Degree Credits to Graduate: B.S. - 130; B.L.A. - 160

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 326 or ENGL 357	Writing in the Design Professions Visual Culture and Language	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

Select from current general education list. 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.		10
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Humanities & Fine Arts (A):

ENVD 101	Introduction to Environmental Design	3
ARCH 321	History and Theory of Architecture I	3

Social & Behavioral Sciences (B):

PSYC 111 or SOC 110	Introduction to Psychology Introduction to Sociology	3
ANTH 111	Introduction to Anthropology	3

Wellness (W): Select from current general education list		2
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Cultural Diversity (D):

ANTH 111	Introduction to Anthropology	3
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Global Perspectives (G):

ARCH 321	History and Theory of Architecture I	3
Total Credits		40

Major Requirements

General Education Requirements		40
Environmental Design Requirements		
ENVD 130	Drawing for Environmental Designers	3
ENVD 172	Environmental Design Fundamentals	4
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 322	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 441	Site Development and Detailing III	4
LA 471	Urban Design Studio	6
LA 472	Remediation & Planting Design Studio	6
LA 552	Advanced Landscape Planning	3
PLSC 355	Woody Landscape Plants	3
Landscape Design Requirements		
LA 563	Programming and Thesis Preparation	3
LA 571	Environmental Planning Studio	6
LA 572	Design Thesis (Capstone) A grade of "C" or better is required)	8
LA 581	Professional Practice	3
LA 590	Seminar	3
Degree Electives:		
Potential of 19 credits to reach 130 for B.S.		19
Potential of 25 credits to reach 160 for B.L.A.		25
Total Credits		162

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- Transfer courses with grades of 'D' will count towards total graduation credits but will not satisfy specific degree requirements.

Minor Requirements**Landscape Architecture Minor****Minor Requirements**

Required Credits: 19

Core Courses

LA 231	Landscape Architecture Graphics	3
LA 271	Introduction to Landscape Architecture Studio	6
Electives: Select ten credits of the following:		
LA 232	Design Technology	
LA 272	Parks & Open Spaces Studio	

LA 322	History of Landscape Architecture
LA 341	Site Development and Detailing I
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.

First Year			
Fall	Credits	Spring	Credits
ENVD 101	3	ENVD 172 or 130	4-3
ENVD 130 or 172	3-4	ENGL 120	3
ENGL 110	3	COMM 110	3
Science/Tech General Education Requirement	3	ANTH 111	3
PSYC 111 or SOC 110	3	Quantitative Reasoning Requirement	3
UNIV 189	1	Wellness Requirement	3
		16-17	19-18
Second Year			
Fall	Credits	Spring	Credits
LA 271	6	LA 272	6
LA 231	3	LA 232	3
ARCH 321	3	LA 322	4
PLSC 355	3	Science/Tech General Education Requirement	3
		15	16
Third Year			
Fall	Credits	Spring	Credits
LA 371	6	LA 372	6
LA 341	4	LA 342	4
LA 331	3	ENGL 326 or 357	3
Science General Education Requirement	3	Elective/Minor	3
Science Lab General Education Requirement	1		
		17	16
Fourth Year			
Fall	Credits	Spring	Credits
LA 471	6	LA 472 or ARCH 474	6
LA 552	3	LA 441	4
Elective/Minor	4	LA 590	3
Elective/Minor	3	Elective/Minor	3
		16	16

Fifth Year			
Fall	Credits	Spring	Credits
LA 571	6	LA 572	8
LA 563	3	Elective/Minor	3
LA 581	3	Elective/Minor	3
Elective/Minor	3		
		15	14

Total Credits: 160

Department of Communication

www.ndsu.edu/communication

The Department of Communication provides undergraduate majors and minors in Journalism, Management Communication, New Media & Web Design, and Strategic Communication.

Pre-Communication Preparation

Students interested in pursuing an undergraduate degree offered by the Department of Communication are enrolled as pre-professional majors and must first complete all courses and requirements associated with the Pre-Communication preparation designation. Once all Pre-Communication preparation courses and requirements are met, the student is accepted into the professional program and may continue pursuing a degree in the Department of Communication.

Experiential On-Campus Opportunities

The department oversees several on-campus communication-related opportunities for students: KDSU 91.9 FM is an affiliate of North Dakota Public Radio with internships available for qualified students; Thunder Radio (<http://www.kndsradio.com>) is NDSU's student-run radio station; and the Spectrum (<http://www.ndsuspectrum.com>) is a student-run newspaper published twice weekly throughout the academic year where students may receive credit or salary. In addition, departmental academic organizations include Public Relations Student Society of America, Bison Information Network, Advertising Club, KNDS-96.3, Lambda Pi Eta, Lincoln Speech and Debate Society, and Pi Kappa Delta. For more information, visit the Department of Communication (<https://www.ndsu.edu/communication>) web site.

Agricultural Communication (p. 158)

Health Communication (p. 161)

Journalism (p. 163)

Management Communication (p. 166)

New Media and Web Design (p. 168)

Strategic Communication (p. 171)

Agricultural Communication

A major or minor in Agricultural Communication 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.

The curricular structure of the Agricultural Communication program is listed below for students entering the program. Students must complete an applied capstone course.

Major Requirements

Major: Agricultural Communication

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 357	Visual Culture and Language	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current education list		3
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Science & Technology (S):		10
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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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):		6
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Courses needed to fulfill this category will be completed as part of the pre-communication requirements.

Wellness (W): Select from current general education list		2
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Cultural Diversity (D):

COMM 216	Intercultural Communication	3
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Global Perspective: Select from current general education list		
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Total Credits		40
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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:

Code	Title	Credits
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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
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ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
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Area Two: Social Sciences		3
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ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
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Area Three: Fine Arts		3
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ARCH, ART, ENVD, LA, MUSC, or THEA		
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Total Credits		9
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Major Requirements

General Education Requirements	40
AH&SS College Requirements	9
Pre-Communication Requirements:	
Students must complete the following 21 credits of selected courses with a grade of 'B' or better to be a communication major. These courses may be repeated only once for grade improvement..	
ENGL 120	College Composition II 3
COMM 110	Fundamentals of Public Speaking 3
or COMM 111	Honors Public Speaking
COMM 112	Understanding Media and Social Change 3
COMM 114	Human Communication 3
COMM 212	Interpersonal Communication 3
COMM 216	Intercultural Communication 3
Select one of the following:	3
SOC 110	Introduction to Sociology
POLS 110	Introduction to Political Science
PSYC 111	Introduction to Psychology
CJ 201	Introduction to Criminal Justice
Professional Agricultural Communication Major	
Communication Core:	
COMM 133	Introduction to Agricultural Communication 3
COMM 320	Communication Analysis 3
COMM 301	Rhetorical Traditions 3
or COMM 321	Introduction to Communication Theory
COMM 431	Communication Ethics and Law 3
COMM 465	Convergence Media (Capstone) 3
Agricultural Core: Students are required to take 12 credits in Agriculture.	12
A minor in agriculture is recommended. Consult with your adviser on elective options.	
Professional Specialization: Select 3 courses from the following:	9
COMM 200	Introduction to Media Writing
COMM 260	Introduction to Web Design
COMM 308	Business and Professional Speaking
COMM 310	Advanced Media Writing
COMM 313	Editorial Processes
COMM 362	Principles of Design For Print
COMM 425	Specialty Writing
COMM 450	Issues in Communication
Degree Requirements: Potential of 22 credits to reach 122.	22
Total Credits	122

Minor Requirements

Agricultural Communication Minor

Minor Requirements

Required Credits: 21

Required Courses (above general education requirements)

COMM 112	Understanding Media and Social Change *	3
COMM 114	Human Communication *	3
COMM 212	Interpersonal Communication *	3
COMM 216	Intercultural Communication *	3
COMM 133	Introduction to Agricultural Communication	3

Professional Specialization: Select 2 courses form the following: 6

COMM 260	Introduction to Web Design	
COMM 308	Business and Professional Speaking	
COMM 362	Principles of Design For Print	
COMM 484	Organizational Advocacy and Issue Management	
COMM 485	Risk and Crisis Communication	
Total Credits		21

* Courses that satisfy general education requirements in the major program of study must be unique from these requirements.

Minor Requirements and Notes

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

Health Communication

A major or minor in Health Communication is an applied program of study aimed at providing both practitioners and future civic leaders with the knowledge they need to improve health services and public health.

The curricular structure of the Health Communication program is listed below for students entering the program. Students must complete an applied capstone course.

Major Requirements

Major: Health Communication

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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Select one of the following:		3
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ENGL 321	Writing in the Technical Professions	
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ENGL 325	Writing in the Health Professions	
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ENGL 324	Writing in the Sciences	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):		10
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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. Select from current general education courses.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):		6
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Courses needed to fulfill this category will be completed as part of the pre-communication requirements.

Wellness (W): Select from current general education list		2
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Cultural Diversity (D):		
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COMM 216	Intercultural Communication	3
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

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

General Education Requirements		40
AH&SS College Requirements		9
Pre-Communication Requirements		
Students must complete the following 21 credits of selected courses with a grade of 'B' or better to be a communication major. These courses may be repeated only once for grade improvement.		
ENGL 120	College Composition II	3
COMM 110	Fundamentals of Public Speaking	3
or COMM 111	Honors Public Speaking	
COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
Select one of the following:		3
SOC 110	Introduction to Sociology	
POLS 110	Introduction to Political Science	
PSYC 111	Introduction to Psychology	
CJ 201	Introduction to Criminal Justice	
Professional Health Communication Major		
Communication Core:		
COMM 320	Communication Analysis	3
COMM 301	Rhetorical Traditions	3
or COMM 321	Introduction to Communication Theory	
COMM 380	Health Communication I	3
COMM 431	Communication Ethics and Law	3
COMM 480	Health Communication II (Capstone)	3
Applied Health Core:		
Students are required to take 12 credits in Applied Health areas: Nursing; Health, Nutrition, and Exercise Science; Pharmacy Practice; or Psychology. Consult your advisor on elective options.		12
Professional Specialization		
Select three of the following:		9
COMM 200	Introduction to Media Writing	
COMM 260	Introduction to Web Design	
COMM 375	Principles of Strategic Communication	
COMM 381	Patient-Provider Communication	

COMM 383	Organizational Communication I	
COMM 450	Issues in Communication	
COMM 485	Risk and Crisis Communication	
COMM 486		
Degree Requirements: Potential of 28 credits to reach 122.		28
Total Credits		122

Minor Requirements

Health Communication Minor

Minor Requirements

Required Credits: 21

Required Courses

COMM 112	Understanding Media and Social Change	3
COMM 114	Human Communication	3
COMM 212	Interpersonal Communication	3
COMM 216	Intercultural Communication	3
COMM 380	Health Communication I	3
COMM 381	Patient-Provider Communication	3
Professional Specialization: Select one of the following:		3

COMM 375	Principles of Strategic Communication	
COMM 480	Health Communication II	
COMM 485	Risk and Crisis Communication	
COMM 486		
Total Credits		21

Minor Requirements and Notes

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

Journalism

A major or minor in Journalism is designed to help students know how to use public print and/or broadcast communication media.

The curricular structure of the Journalism program is listed below for students entering the program. The major consists of two tracks: Print and Broadcasting. Each track has separate requirements and students must choose one track. Students must complete an applied capstone course.

Major Requirements

Major: Journalism

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One course Upper Level Writing. Select one of the following:		3

ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list.		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		6
Courses needed to fulfill this category will be completed as part of the pre-communication requirements.		
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
COMM 216	Intercultural Communication	3
Global Perspectives (G): Select from current general education list		
Total Credits		40

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:

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

General Education Requirements		40
AHSS College Requirements		9
Pre-Communication Requirements		
Students must complete 21 credits of selected courses with a grade of 'A' or 'B' to become a communication major. These courses may be repeated only once for this 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 216	Intercultural Communication	3
Select one of the following:		3
CJ 201	Introduction to Criminal Justice	

POLS 110	Introduction to Political Science	
PSYC 111	Introduction to Psychology	
SOC 110	Introduction to Sociology	
Professional Major - 36 credits		
Core:		
COMM 200	Introduction to Media Writing *	3
COMM 301	Rhetorical Traditions	3
or COMM 321	Introduction to Communication Theory	
COMM 310	Advanced Media Writing	3
COMM 320	Communication Analysis *	3
COMM 431	Communication Ethics and Law	3
COMM 496	Field Experience	3
Choose one of the following tracks:		9
Print Track:		
COMM 313	Editorial Processes	3
COMM 330	Photography for the Media	3
COMM 465	Convergence Media	3
Broadcasting Track:		
COMM 245	Principles of Broadcast Production	3
COMM 442	Digital Media and Society	3
COMM 445	Advanced Broadcast Production (Capstone)	3
Major Electives:		9
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	
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 Print	
COMM 421	History of Journalism	
COMM 445	Advanced Broadcast Production	
COMM 450	Issues in Communication	
COMM 465	Convergence Media	
Degree Requirements: Potential of 28 credits to reach 122		28
Total Credits		122

* A grade of B or better is required in COMM 200: Introduction to Media Writing and COMM 320: Communication Analysis.

NOTE: No more than 6 credits from this communication major may be applied to any minor in the Department of Communication.

Minor Requirements

Journalism Minor

Minor Requirements

Required Credits: 21

Required Courses

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 12

COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	

COMM 310	Advanced Media Writing
COMM 313	Editorial Processes (Pre-req. COMM 200)
COMM 330	Photography for the Media
COMM 347	Television On-Air Performance
COMM 349	Television Studio Production
COMM 362	Principles of Design For Print
COMM 421	History of Journalism
COMM 445	Advanced Broadcast Production
COMM 465	Convergence Media

Total Credits**21**

Minor Requirements and Notes

- Students must earn a minimum GPA of 2.75 in courses applied to the minor.
- No more than 6 credits from this communication minor may be applied to any major in the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Management Communication

A major or minor in Management Communication is designed to train students to be effective managers, leaders, and communication specialists in corporate environments.

The curricular structure of the Management Communication program is listed below for students entering the program.

Major Requirements

Major: Management Communication

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 357	Visual Culture and Language	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list.		10
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Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B):	6
Courses needed to fulfill this category will be completed as part of the pre-communication requirements.	
Wellness (W): Select from current general education list	2
Cultural Diversity (D):	
COMM 216 Intercultural Communication	3
Global Perspectives (G): Select from current general education list	
Total Credits	40

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:

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

General Education Requirements	40
AHSS College Requirements	9
Pre-Communication Requirements	
Students must complete 21 credits of selected courses with a grade of 'B' or 'A' to become a communication major. These courses may be repeated only once for this 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 216 Intercultural Communication	3
Select one of the following:	3
CJ 201 Introduction to Criminal Justice	
POLS 110 Introduction to Political Science	
PSYC 111 Introduction to Psychology	
SOC 110 Introduction to Sociology	
Professional Management Communication Major	
COMM 301 Rhetorical Traditions	3
or COMM 321 Introduction to Communication Theory	
COMM 320 Communication Analysis	3
COMM 383 Organizational Communication I	3
COMM 431 Communication Ethics and Law	3
COMM 482	3
COMM 496 Field Experience	3
Major Electives	18
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	
PSYC 221	Psychology Applied to Work	
SOC 233	Sociology of Organizations and Work	
Degree Requirements: Potential of 28 credits to reach 122		28
Total Credits		122

NOTE: No more than 6 credits from this communication major may be applied to any minor in the Department of Communication.

Minor Requirements

Management Communication Minor

Minor Requirements

Required Credits: 21

Required Courses

COMM 212	Interpersonal Communication	3
COMM 383	Organizational Communication I	3
COMM 482		3

Professional Specialization

COMM 308	Business and Professional Speaking	12
COMM 315	Small Group Communication	
COMM 316	Conflict Communication	
COMM 318	Argumentation and Advocacy	
COMM 412	Gender and 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

- Students must earn a minimum GPA of 2.75 in courses applied to the minor.
- No more than 6 credits from this communication minor may be applied to any major in the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

New Media and Web Design

The New Media and Web Design major and minor are interdisciplinary programs of study offered through the Department of Communication (<https://www.ndsu.edu/communication>).

This major is designed to include not only instruction to develop skills associated with preparing content, designing, and coding web sites; but also the examination of larger issues, such as how digital media pervades all levels of society.

The curricular structure of the New Media and Web Design program is listed below for students entering the program. Students must complete an applied capstone course.

Major Requirements

Major: New Media and Web Design

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 357	Visual Culture and Language	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

CSCI 116	Business Use of Computers	4
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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. Select from current general education list.		6
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):		6
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Courses needed to fulfill this category will be completed as part of the pre-communication requirements.		
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D):		
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COMM 216	Intercultural Communication	3
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

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****General Education Requirements** **40****AHSS College Requirements** **9****Pre-Communication Requirements**

Students must complete 21 credits of selected courses with a grade of 'B' or 'A' to become a communication major. These courses may be repeated only once for this 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 216	Intercultural Communication	3
Select one of the following:		3
CJ 201	Introduction to Criminal Justice	
POLS 110	Introduction to Political Science	
PSYC 111	Introduction to Psychology	
SOC 110	Introduction to Sociology	

Professional New Media & Web Design Major

Prerequisite for the major: CSCI 114 or CSCI 116, which count toward General Education category 3.

COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
COMM 363	Advanced Web Design	3
COMM 431	Communication Ethics and Law	3
COMM 496	Field Experience	3
CSCI 160	Computer Science I	4
CSCI 371	Web Scripting Languages	3

Electives **15**

Students in the New Media and Web Design major specialize in web design (content interface and marketing) or web development (coding and programming) as indicated by the tracks below.

Web Design Track

ART 185	Design and Digital Media I	
ART 285	Design and Digital Media II	
COMM 200	Introduction to Media Writing	
COMM 245	Principles of Broadcast Production	
COMM 310	Advanced Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Print	
COMM 442	Digital Media and Society	
COMM 465	Convergence Media	
COMM 494	Individual Study	
CSCI 122	Visual BASIC	
CSCI 227	Computing Fundamentals I	

Web Development Track

COMM 200	Introduction to Media Writing	
COMM 330	Photography for the Media	
COMM 442	Digital Media and Society	
COMM 465	Convergence Media	
COMM 494	Individual Study	

CSCI 122	Visual BASIC	
CSCI 159	Computer Science Problem Solving	
CSCI 227	Computing Fundamentals I	
CSCI 228	Computing Fundamentals II	
CSCI 277	Introduction to UNIX	
CSCI 366	Database Systems	
CSCI 445	Software Projects Capstone	
CSCI 488	Human-Computer Interaction	
Degree Requirements: Potential of 27 credits to reach 122		27
Total Credits		122

NOTE: No more than 6 credits from this communication major may be applied to any minor in the Department of Communication.

Minor Requirements

Web Design Minor

Minor Requirements

Required Credits: 21

Required Courses

COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
COMM 363	Advanced Web Design	3
Professional Specialization		12
ART 185	Design and Digital Media I	
COMM 200	Introduction to Media Writing	
COMM 313	Editorial Processes	
COMM 330	Photography for the Media	
COMM 362	Principles of Design For Print	
COMM 465	Convergence Media	
CSCI 122	Visual BASIC	
CSCI 159	Computer Science Problem Solving	
CSCI 160	Computer Science I	
CSCI 227	Computing Fundamentals I	
CSCI 277	Introduction to UNIX	
CSCI 366	Database Systems	
CSCI 371	Web Scripting Languages	
CSCI 488	Human-Computer Interaction	
Total Credits		21

Minor Requirements and Notes

- Professional specialization must contain courses from at least two departments.
- Students must earn a minimum GPA of 2.75 in courses applied to the minor.
- No more than 6 credits from this communication minor may be applied to any major in the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Strategic Communication

A major or minor in strategic communication prepares students to conduct research and design messages in order to communicate effectively with various publics. After completing the core courses in the major or minor, students can specialize in advertising, health communication, or public relations.

Major Requirements

Major: Strategic Communication

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 357	Visual Culture and Language	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current education list		3
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Science & Technology (S):		10
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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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):		6
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Courses needed to fulfill this category will be completed as part of the pre-communication requirements.

Wellness (W): Select from current general education list		2
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Cultural Diversity (D):		
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COMM 216	Intercultural Communication	3
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Global Perspective: Select from current general education list		
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Total Credits		40
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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:

Code	Title	Credits
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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
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ARB, ENGL, FREN, GERM, HIST, HUM, PHIL, RELS, SPAN, or WGS		
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Area Two: Social Sciences		3
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ANTH, CJ, COMM, EMGT, POLS, SOC, or WGS		
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Area Three: Fine Arts	3
ARCH, ART, ENVD, LA, MUSC, or THEA	
Total Credits	9

Major Requirements

General Education Requirements	40
AH&SS College Requirements	9

Pre-Communication Requirements:

Students must complete the following 21 credits of selected courses with a grade of 'B' or 'A' to be a communication major. These courses may be repeated only once for grade improvement..

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 216	Intercultural Communication	3
Select one of the following:		3
CJ 201	Introduction to Criminal Justice	
POLS 110	Introduction to Political Science	
PSYC 111	Introduction to Psychology	
SOC 110	Introduction to Sociology	

Professional Strategic Communication Major

COMM 200	Introduction to Media Writing	3
COMM 301	Rhetorical Traditions	3
or COMM 321	Introduction to Communication Theory	
COMM 375	Principles of Strategic Communication	3
COMM 431	Communication Ethics and Law	3
COMM 465	Convergence Media (Capstone)	3
COMM 474	Communication Campaigns	3
COMM 477		3
COMM 496	Field Experience	3

Major Electives	12
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12 credits of 300-400 level COMM courses directed toward area(s) of specialization - Advertising, Health Communication, or Public Relations. Additional specializations may be added in the future. Consult with your advisor for current options and recommended electives.

Degree Requirements: Potential of 28 credits to reach 122.	28
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Total Credits	122
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NOTES:

- Students specializing in Health Communication can apply up to 9 credits in Applied Health areas - Health, Nutrition, and Exercise Science; Nursing; Pharmacy Practice; Psychology - toward major electives. These credits must be distinct from those being applied to the student's Minor requirements.
- No more than 6 credits from this communication major may be applied to any minor in the Department of Communication.

Minor Requirements

Strategic Communication Minor

Minor Requirements

Required Credits: 21

Required Courses

COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
COMM 375	Principles of Strategic Communication	3

Professional Specialization		12
COMM 310	Advanced Media Writing	
COMM 376	Advertising Creative Strategies	
COMM 377	Advertising Media Planning	
COMM 431	Communication Ethics and Law	
COMM 465	Convergence Media	
COMM 474	Communication Campaigns	
COMM 477		
COMM 484	Organizational Advocacy and Issue Management	
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.
- No more than 6 credits from this communication minor may be applied to any major in the Department of Communication.
- A minimum of 9 credits must be taken at NDSU.

Department of Criminal Justice and Political Science

www.ndsu.edu/cjps

The department offers degree programs (B.A. and B.S.) as well as minor programs of study in Criminal Justice and Political Science.

Pre-Criminal Justice Preparation

Students intent on pursuing an undergraduate degree in criminal justice are enrolled as pre-professional majors and must first meet GPA and coursework requirements in order to be admitted to the Criminal Justice program. Once students satisfy all requirements, they may complete and submit the Pre-Criminal Justice application form, available from the Department's web site (<https://www.ndsu.edu/cjps>). After verification that requirements have been met, students are accepted into the professional program and can pursue a degree in criminal justice.

Pre-Political Science Preparation

Students intent on pursuing an undergraduate degree in Political Science are enrolled as pre-professional majors and must first meet GPA and coursework requirements in order to be admitted to the Political Science program. Once students satisfy all requirements, the student completes and submits the Pre-Political Science application form, available from the Department's web site (<http://www.ndsu.edu/cjps>). After verification that the student meets the requirements have been met, students are accepted into the professional program and can pursue a degree in Political Science.

Clubs and Internships

The department is home to the Criminal Justice Club and the Pre-Law Club. 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. For specifics, contact the Department of Criminal Justice and Political Science (<https://www.ndsu.edu/cjps>) or the Career Center (<https://www.ndsu.edu/career>).

Criminal Justice (p. 174)

Fraud Investigation (p. 178)

Political Science (p. 179)

Criminal Justice

Criminal Justice Major

The criminal justice practitioner deals with the broad areas of law enforcement, courts, corrections, and social services. Professional positions may include federal law enforcement, municipal law enforcement, juvenile and adult probation, counseling and correctional work in institutions, victim advocacy programs, and halfway houses. Within these broad areas the practitioner enjoys exciting professional challenges and opportunities for serving society and helping people.

Examples of agencies that have employed NDSU graduates include: the FBI, Drug Enforcement Administration, local police departments, sheriff 's departments, Border Patrol, juvenile courts, Bureau of Criminal Investigation, U.S. Secret Service, probation and parole departments, juvenile and adult correctional institutions, halfway houses, and crime and delinquency prevention programs.

The Criminal Justice curriculum is an interdisciplinary program drawing on the social sciences, behavioral sciences, humanities, computer sciences, and accounting. A total of 62 credits in criminal justice and related coursework is required for the major. A basic background in the social sciences, behavioral sciences, and civics is helpful.

Criminal Justice Minor

The minor in Criminal Justice provides an opportunity for students with majors in fields outside of the Criminal Justice program to gain valuable knowledge regarding criminological theory and the history, operation and effectiveness of various parts of the criminal and juvenile justice system.

Major Requirements

Major: Criminal Justice

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ANTH 111	Introduction to Anthropology	3
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SOC 110	Introduction to Sociology	3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D):

ANTH 111	Introduction to Anthropology	3
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

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		
General Education Requirements		40
AHSS College Requirements		9
Pre-Criminal Justice Requirements		
Complete 9 credit hours with an average GPA of 3.0 or higher in the courses listed. Only one re-take of these 3 courses is allowed.		
CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology and Criminal Law	3
Professional Major Requirements		
Professional courses require a minimum 3.0 GPA		
CJ 325 or POLS 325	Applied Research Methods	4
CJ 330 or POLS 431	Criminal Law and Procedure Constitutional Law-Criminal Justice	2-3
CJ 406	Crime and Delinquency	3
CJ 407	Deviant Behavior	3
CJ 460	Criminal Court System	3
CJ 461	Corrections	3
CJ 465	Women and Minorities in Criminal Justice	3
CJ 489	Senior Capstone in Criminal Justice	1
Additional Program Requirements:		
Psychology Courses: 12 credits required (PSYC 111 is the pre-requisite for these courses)		
PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3
PSYC 212 or PSYC 380	Psychological Aspects of Drug Use and Abuse Clinical Psychology	3
PSYC 270	Abnormal Psychology	3
Accounting/Business Course:		
ACCT 102	Fundamentals of Accounting	3
Political Science Course:		
POLS 230	Judicial Process	3
Criminal Justice Elective: Select 3 credits from the following:		
CJ 225	Punishment and the Death Penalty	
CJ 226	Criminal Investigation	
CJ 310	Women and Policing	
CJ 354	Media, Crime and Justice in America	
CJ 379	Study Tour Abroad	
Degree Requirements: Potential of 21 credits to reach 122		21
Total Credits		122-123

Degree Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application to professional program.
- To apply, a student must have completed a minimum of 45 credit hours and achieved a minimum GPA of 2.75 in all coursework, including transfer work.
- Students are allowed only one re-take of any pre-professional or upper level criminal justice core course.
- Once admitted to the professional Criminal Justice program, failure to maintain the minimum GPA of 3.00 in the core upper-level criminal justice courses will result in an academic warning issued from the department for the first violation. Students will receive notification of this warning at their NDSU email address. If the GPA falls below 3.00 for a second semester in professional-level core CJ courses, the student will be administratively removed from the criminal justice professional program.
- Internal and external transfer students will be handled similarly to students who commence their studies in the pre-professional program.
- Students who entered the University and/or declared criminal justice as their major prior to fall 2012 will be grandfathered into the program and will not be subject to these guidelines.
- These guidelines apply for all majors and minors of criminal justice.

Minor Requirements

Criminal Justice Minor

Minor Requirements

Required Credits: 18

Required Courses

CJ 201	Introduction to Criminal Justice	3
CJ 210	Introduction to Policing	3
CJ 230	Criminology and Criminal Law	3
CJ 460	Criminal Court System	3
CJ 461	Corrections	3
Electives: Select 3 credits from the following:		3
CJ 225	Punishment and the Death Penalty	
CJ 226	Criminal Investigation	
CJ 310	Women and Policing	
CJ/POLS 325	Applied Research Methods *	
CJ 330	Criminal Law and Procedure	
CJ 354	Media, Crime and Justice in America	
CJ 379	Study Tour Abroad	
CJ 399	Special Topics	
CJ 406	Crime and Delinquency	
CJ 407	Deviant Behavior	
CJ 465	Women and Minorities in Criminal Justice	
CJ 489	Senior Capstone in Criminal Justice	

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

- Students should refer to www.ndsu.edu/cjps for information regarding the application for minor.
- A minimum of 8 credits must be taken at NDSU.
- A minimum 3.0 GPA is required for all courses needed to complete the minor.
- To apply, a student must have completed a minimum of 45 credit hours and achieve a minimum GPA of 2.75 in all coursework including any transfer work.
- A student must average a 3.0 GPA or higher in these courses: (CJ 201 Introduction to Criminal Justice, CJ 210 Introduction to Policing, and CJ 230 Criminology and Criminal Law).
- Only one re-take of any minor course is allowed.

- Failure to maintain a minimum GPA of 3.00 in the minor courses for criminal justice will result in an academic warning issued from the department for the first violation. Students will receive notification of this warning via their NDSU email address. If the GPA falls below 3.00 for a second semester in criminal justice minor courses, the student will be administratively removed from the program.

Freshman		
Fall	Credits Spring	Credits
ENGL 120	3 COMM 110	3
SOC 110	3 ANTH 111	3
6		6

Total Credits: 12

Fraud Investigation

Fraud Investigation

The Department of Accounting, Finance, and Information Systems, in collaboration with the Department of Criminal Justice and Political Science, 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, Finance, and Information Systems (https://www.ndsu.edu/acct_fin_mis) or the Department of Criminal Justice and Political Science (<https://www.ndsu.edu/cjps>) for further information on requirements.

Minor Requirements

Fraud Investigation Minor

Minor Requirements

Required Credits: 20-21

This minor requires a grade of 'C' or better and a GPA of 2.50 in all courses that make up this minor. The only exception is ACCT 200 and ACCT 201, which require grades of 'B' or better to enroll in 300-400 level accounting courses.

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
ACCT 410	Fraud Examination *	3
ACCT 411	Advanced Fraud Examination **	3
Criminal Justice Courses		
CJ 201	Introduction to Criminal Justice	3
CJ 230	Criminology and Criminal Law	3
Criminal Justice or Political Science Course		
CJ 330 or POLS 431	Criminal Law and Procedure Constitutional Law-Criminal Justice	2-3
Total Credits		20-21

* ACCT 421 Auditing I: may substitute for this course if the student has taken ACCT 610 Fraud Examination and ACCT 611 Advanced Fraud Examination

** 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 (<https://www.ndsu.edu/business/majorsminorslist/minors>) with the College of Business. Acceptance into this minor program requires students to have a minimum institutional cumulative GPA of 2.50 and at least junior standing (60 credits). To complete a minor, students must earn at least a 2.50 GPA in courses used to satisfy 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 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.

Political Science

Political Science Major

Political Science is the study of politics, government, and public policy. This includes the investigation of political institutions, international relations, law, and political values. The purpose of classes in political science is to provide students with knowledge to assist them in understanding how government and politics affect their everyday lives. A political science major offers the student career opportunities in public service, business, and education. Also, many students interested in attending law school select Political Science as a major. As part of its offerings the department offers a special program of pre-law advisement.

A total of 37 credits of major coursework is required for Political Science. All students are required to complete POLS 110 Introduction to Political Science or POLS 115 American Government, POLS 325 Applied Research Methods, POLS 240 Political Ideologies, POLS 220 International Politics or POLS 225 Comparative Politics, and POLS 489 Senior Seminar. In addition, four 400-level classes must be taken; one from each of these areas: law, American Government, comparative politics, and international relations. Nine credits of electives are also to be selected in consultation with an adviser.

Political Science Minor

The minor in Political Science requires a minimum of 21 credits including Introduction to Political Science or American Government and International Politics or Comparative Politics. Three classes of the student's choice at the 400-level in law, behavior, international relations, or comparative politics are required. Six credits of electives also are to be selected in consultation with an adviser.

Pre-Law Emphasis

The department offers a special Pre-Law emphasis for those individuals who wish to pursue careers in law. It consists of a major in Political Science that includes a concentration of law related courses, as well as required classes in English and communication. Electives in business, communication, criminal justice and accounting are also part of the emphasis. For further information and specific course requirements contact any political science faculty.

Public Service Option

The department offers a special Public Service emphasis for those individuals who wish to pursue careers in public policy or related fields. It consists of a major in Political Science that includes a concentration of public policy courses. Electives in accounting, management, communication, and related fields are also part of the emphasis. For further information and specific course requirements, contact any political science faculty.

Political Science - Standard (p. 180)

Political Science - Pre-Law (p. 182)

Political Science - Public Service (p. 185)

Minor Requirements

Political Science Minor

Minor Requirements

Required Credits: 21

Required Courses

POLS 110 or POLS 115	Introduction to Political Science American Government	3
POLS 220 or POLS 225	International Politics Comparative Politics	3
POLS 240	Political Ideologies	3
POLS	100 or 200 level	3
Electives: Areas of law, behavior, international relations or comparative politics (at 400 level)		6
Additional Electives: Selected in consultation with adviser		3
Total Credits		21

Minor Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application for minor.
- A minimum of 8 credits must be taken at NDSU.
- To apply, a student must have completed a minimum of 36 credit hours upon application.
- To apply, a student must have achieved a minimum GPA of 2.75 in all coursework.
- Complete the 12 credit core with an average GPA of 3.0 or better.
- Failure to maintain a minimum GPA of 3.00 in the minor courses for political science will result in an academic warning issued from the department for the first violation. Students will receive notification of this warning at their NDSU email address. If the GPA falls below 3.00 for a second semester in the minor POLS courses, the student will be administratively removed from the program.

Political Science - Standard

Major Requirements

Major: Political Science - Standard

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list.		10
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Science (B):

POLS 110	Introduction to Political Science	3
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or POLS 115	American Government	
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Select from current general education list		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

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

Professional courses require a minimum GPA of 3.00.

General Education Requirements		40
AH&SS College Requirement		9
Pre-Political Science Requirements:		
Must complete the following 12 credits of pre-political science courses with an average GPA of 3.00.		
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
POLS	100 or 200 level course	3
Professional Major Requirements:		
POLS 325	Applied Research Methods	4
POLS 489	Senior Seminar	3
Select a minimum of one course from each of the four areas listed below:		12
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	Current Topics in International 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		6
At least 6 credits must be from permanently numbered courses. Courses which are eligible to fulfill this requirement may come from Special Topic classes offered by the Political Science Department; classes may also include those not selected to meet the requirements in Sections I and II above, or any of the following courses:		
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	
Degree Requirements: Potential of 36 credits to reach 122		36
Total Credits		122

Degree Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application to professional program.
- The department will review applications on a rolling basis. Student must apply to be a major or minor no later than the first day of classes of the semester in which they intend to graduate.
- To apply, a student must have completed a minimum of 36 credit hours and achieve a minimum GPA of 3.0 in the pre-political science courses and 2.75 overall in NDSU coursework.
- Once admitted to the professional political science program, failure to maintain a minimum GPA of 3.00 in the professional political science courses and a cumulative 2.75 in all coursework will result in an academic warning issued by the department for the first violation. Students will receive notification of this warning at their NDSU email address. Failure to return to these minimum standards will result in being administratively removed from the program.
- Internal and external transfer students will be handled similarly to students who commence their studies in the pre-professional program.
- Students who entered the University and declared political science as their major prior to fall 2012 will be grandfathered into the program and will not be subject to these guidelines.
- These guidelines apply for all majors and minors of political science.

Political Science - Pre-Law

Major Requirements

Major: Political Science - Pre-Law Option

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		
Social & Behavioral Sciences (B):		
POLS 110	Introduction to Political Science	3
or POLS 115	American Government	
Select an additional course from current general education list		3
Wellness (W): Select from current general education list		
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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:

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

General Education Requirements		40
AH&SS College Requirement		9
Pre-Political Science Requirements: Must complete the following 12 credits of pre-political science courses with an average GPA of 3.00.		
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
POLS	100 or 200 level	3
Professional Major Requirements:		
Professional courses will require a minimum 3.0 GPA.		
A single International Law course satisfied either a core requirement or an Area 2 requirement, but not both.		
POLS 230	Judicial Process	3
POLS 325	Applied Research Methods	4
POLS 430	Constitutional Law-Civil Liberties	3
POLS 431	Constitutional Law-Criminal Justice	3
POLS 444	International Law	3
or POLS 446	Current Topics in International Law	
POLS 489	Senior Seminar	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) 29-30

Professional Area I: One 400 level course in 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	International Law	
or POLS 446	Current Topics in International 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 3 courses from the following:		9
COMM 214	Persuasive Speaking	
or COMM 308	Business and Professional Speaking	
COMM 216	Intercultural Communication	
COMM 318	Argumentation and Advocacy	
or COMM 383	Organizational Communication I	
ENGL 358	Writing in the Humanities and Social Sciences	
Professional Area III: Law Related Courses - Select 4 courses from the following:		11-12
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 and Criminal Law	
CJ 330	Criminal Law and Procedure	
COMM 433	Legal Communication	
COMM 434	Communication Law	
Degree Requirements Potential of 13 credits to reach 122		13
Total Credits		122-123

Degree Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application to professional program.
- The department will review applications on a rolling basis. Student must apply to be a major or minor no later than the first day of classes of the semester in which they intend to graduate.
- To apply, a student must have completed a minimum of 36 credit hours and achieve a minimum GPA of 3.0 in the pre-political science courses and 2.75 overall in NDSU coursework.
- Once admitted to the professional political science program, failure to maintain a minimum GPA of 3.00 in the professional political science courses and a cumulative 2.75 in all coursework will result in an academic warning issued by the department for the first violation. Students will receive notification of this warning at their NDSU email address. Failure to return to these minimum standards will result in being administratively removed from the program.
- Internal and external transfer students will be handled similarly to students who commence their studies in the pre-professional program.

- Students who entered the University and declared political science as their major prior to fall 2012 will be grandfathered into the program and will not be subject to these guidelines.
- These guidelines apply for all majors and minors of political science.

Political Science - Public Service

Major Requirements

Major: Political Science - Public Service Option

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

POLS 110	Introduction to Political Science	3
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or POLS 115	American Government	
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Select from current general education list		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits		40
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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:

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

General Education Requirements	40
AH&SS College Requirement	9
Pre-Political Science Requirements: Must complete the following 12 credits of pre-political science courses with an average GPA of 3.00.	
POLS 110 or POLS 115	3
POLS 220 or POLS 225	3
POLS 240	3
POLS	3
Professional Major Requirements: Professional courses will require a minimum 3.0 GPA.	
POLS 215	3
POLS 325	4
POLS 420	3
POLS 422	3
POLS 423	3
POLS 430 or POLS 431	3
POLS 442 or POLS 444 or POLS 446	3
POLS 450 or POLS 451 or POLS 452	3
POLS 489	3
POLS 496	9
Supplemental Requirements: Pre-requisites apply to all courses. Select 5 courses from the following:	15
ACCT 200	
ACCT 201	
MGMT 320	
COMM 383	
ECON 202	
EMGT 101	
ENGL 320	
SOC 115	
HDFS 353	
Degree Requirements: Potential of 9 credits to reach 122	9
Total Credits	122

Degree Requirements and Notes

- Students should refer to www.ndsu.edu/cjps for information regarding application to professional program.
- The department will review applications on a rolling basis. Student must apply to be a major or minor no later than the first day of classes of the semester in which they intend to graduate.

- To apply, a student must have completed a minimum of 36 credit hours and achieve a minimum GPA of 3.0 in the pre-political science courses and 2.75 overall in NDSU coursework.
- Once admitted to the professional political science program, failure to maintain a minimum GPA of 3.00 in the professional political science courses and a cumulative 2.75 in all coursework will result in an academic warning issued by the department for the first violation. Students will receive notification of this warning at their NDSU email address. Failure to return to these minimum standards will result in being administratively removed from the program.
- Internal and external transfer students will be handled similarly to students who commence their studies in the pre-professional program.
- Students who entered the University and declared political science as their major prior to fall 2012 will be grandfathered into the program and will not be subject to these guidelines.
- These guidelines apply for all majors and minors of political science.

Department of Emergency Management

www.ndsu.edu/emgt

The Department of Emergency Management offers a major and minor in Emergency Management at the undergraduate level. The minor options include Comprehensive Emergency Management, Preparedness and Response, Mitigation and Recovery, and International Emergency Management. Emergency Management is a growing profession and discipline of study addressing all phases of disaster and risk management. The mission of the major is to develop graduates with extensive theoretical and applied knowledge in emergency management and disaster research. The program is based on an all hazards approach which includes natural and technological disasters as well as other human made hazards.

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, federal and the military. A wide variety of local, national, and international voluntary organizations routinely hire graduates educated in emergency management for humanitarian relief efforts and related activities. Finally, there is increasing need in the private, business sector for emergency management and crisis management to address business and operational continuity. There has been an upward trend in the consequences of natural and technological disasters in the last 30 years. As a result, emphasis is being placed on the vulnerability and risk reduction to natural disasters such as Hurricane Sandy, tornado outbreaks in Missouri and Oklahoma, the cascading earthquake, tsunami and nuclear incident in Japan, the Haiti earthquake, Hurricane Katrina and human made incidents and disasters such as the terrorist attacks on September 11, 2001.

Emergency Management (p. 187)

Emergency Management

Emergency Management Major

The mission of the major is to develop graduates with extensive theoretical and applied knowledge in emergency management and disaster research. The program is based on an all hazards approach which includes natural and technological disasters as well as other human made hazards. The Emergency Management major is a professional program and requires students to complete a pre-professional program before being admitted into the major as a professional student. To be admitted into the Emergency Management major, students must have: 1) completed at least 12 total credit hours at NDSU upon application (see department for application material); 2) achieve a minimum GPA of 2.50 across all coursework completed at NDSU including transfer coursework; 3) completed EMGT 101 with a grade of 'B' or better or have a minimum of a 3.0 cumulative GPA for EMGT prefix courses taken at the time of application; 4) students must maintain a minimum GOA of 3.0 across all EMGT prefix courses and failure to maintain a 3.0 GPA in the EMGT prefix courses will result in academic warning from the department. If the GPA falls below 3.0 for a second time, the student will be administratively removed from the Emergency Management major; and 5) a grade of 'D' in an EMGT prefix course will result in that course not counting toward the major. Only one retake to remediate a 'D' grade is allowed.

Emergency Management Minor

The Department of Emergency Management offers a minor with a variety of options to enhance the educational background and career opportunities for students from various majors.

- The **Comprehensive Emergency Management** option covers all of the disaster phases and includes an elective course.
- The **Preparedness and Response** option focuses on those activities that compliment majors related to planning activities and responder engagements. An additional two elective courses round out this minor.
- The **Mitigation and Recovery** option focuses on structural as well as social and behavioral aspects of minimizing disaster impacts as well as recovering from them. Courses that deepen the student's knowledge of these functions are included in the elective category.
- The **International Emergency Management** option covers the disaster phases of response and recovery as they typically involve collaboration and intervention from international partners. Specific international issues courses and electives are also included in this minor.

Major Requirements

Major: Emergency Management

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list. 10

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

SOC 110	Introduction to Sociology	3
Select from current general education courses		3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

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:

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**

Emergency Management is a professional program of study. No grades of 'D' allowed in EMGT prefix courses. See application (<http://www.ndsu.edu/emgt/undergraduate/#c327405>) material for information.

General Education Requirements 40**AH&SS College Requirement** 9**Emergency Management Core Courses:**

EMGT 101	Emergencies, Disasters, and Catastrophes †	3
EMGT 261	Disaster Preparedness *	3
EMGT 262	Disaster Mitigation *	3
EMGT 263	Disaster Response *	3
EMGT 264	Disaster Recovery *	3
EMGT 291	Seminar *	1
EMGT 430	Emergency Management Capstone (Capstone) *	3
EMGT 496	Field Experience *	3

Sociology Core Courses:

SOC 340	Social Research Methods	3
SOC 341	Social Research Methods Laboratory	1

Emergency Management Electives: Select 4 of the following: 12

EMGT 150	Homeland Security: An Exploration *	
EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments *	
EMGT 425	International Emergency Management *	
EMGT 435	Issues in Homeland Security and Emergency Management *	
EMGT 445	Vulnerability and Functional Needs in Emergency Management *	
EMGT 461	Business Continuity and Crisis Management *	
EMGT 463	Voluntary Agency Disaster Services *	
EMGT 464	Disaster and Culture	3
EMGT 481	Disaster Analysis *	
EMGT 491	Seminar *	

Degree Requirements: Potential of 32 credits to reach 122 32**Total Credits** 122

* No grades of 'D' allowed. Only one retake to remediate a 'D' grade is allowed.

† A grade of 'B' or better required.

Degree Notes:

- Admission to the Emergency Management undergraduate major at NDSU requires students to satisfy several curriculum requirements. Each requirement must be satisfied in order to be admitted to the program. Prior to admission, students will be listed in the pre-professional program if they indicate Emergency Management as their major. All students in the pre-professional program are strongly encouraged to seek out their adviser each semester to ensure that they are satisfying these guidelines.
- Emergency Management application (<http://www.ndsu.edu/emgt/undergraduate/#c327405>) material can be obtained from the website (<http://www.ndsu.edu/emgt>).

Recommended minors: Business Administration, Communication, Community Development, Criminal Justice, Environmental Science, Food Safety, Geography, Logistics Management, Political Science, Psychology, or Sociology.

Minor Requirements

Emergency Management Minor

Minor Requirements

Required Credits: 18

Emergency Management Core - to be completed with all options:

EMGT 101	Emergencies, Disasters, and Catastrophes	3
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Select one of the following 4 options listed below: 15

Total Credits 18

Option One: Comprehensive Emergency Management

Disaster Stages

EMGT 261	Disaster Preparedness	3
EMGT 262	Disaster Mitigation	3
EMGT 263	Disaster Response	3
EMGT 264	Disaster Recovery	3

Electives

Select one of the following: 3

EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 425	International Emergency Management	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 463	Voluntary Agency Disaster Services	

Total Credits 15

Option Two: Preparedness and Response Functions

EMGT 150	Homeland Security: An Exploration	3
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Disaster Stages:

EMGT 261	Disaster Preparedness	3
EMGT 263	Disaster Response	3

Electives:

Select two of the following: 6

EMGT 410	Comprehensive Emergency Management Planning	
EMGT 435	Issues in Homeland Security and Emergency Management	
EMGT 461	Business Continuity and Crisis Management	

Total Credits 15

Option Three: Mitigation and Recovery Functions

Disaster Stages

EMGT 262	Disaster Mitigation	3
EMGT 264	Disaster Recovery	3

Electives

Select three of the following: 9

EMGT 410	Comprehensive Emergency Management Planning	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 420	Hazard, Risk, and Vulnerability Assessments	
EMGT 463	Voluntary Agency Disaster Services	

Total Credits 15

Option Four: International Emergency Management

Disaster Stages

EMGT 263	Disaster Response	3
EMGT 264	Disaster Recovery	3

International Issues

EMGT 425	International Emergency Management	3
EMGT 463	Voluntary Agency Disaster Services	3

Electives

Select one of the following:		3
SOC 443	International Disasters	
EMGT 445	Vulnerability and Functional Needs in Emergency Management	
EMGT 464	Disaster and Culture	

Total Credits

15

Minor Requirements and Notes

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

Department of English

www.ndsu.edu/english

The English Department offers a diverse set of courses in literature, writing studies, linguistics, film, and English Education. English majors form strong communication skills, learn effective research methods, develop flexibility in facing complex situations, and increase their awareness of the humanities tradition. These ideals suit both the liberal arts major and the practical, pre-professional student. Success in an information economy is dependent upon one's ability to produce, analyze, understand, and restate written, oral, and visual material. Through its offerings, the department continues the rich tradition of language and literature study while it also responds to the needs of today's students.

The department teaches and values collaboration among its students, and seeks out collaborations for itself at NDSU. The department contributes to the Humanities major (p. 200), the Scholars Program, and the Women and Gender Studies minor (p. 259). Moreover, the department supports the Cooperative Education Program (<https://www.ndsu.edu/career/internshipprogram>) and welcomes efforts to create student internships. The department serves the university's students through the General Education Writing Curriculum and it welcomes and encourages double majors and minors.

The English Department offers a Bachelor of Arts degree and a Bachelor of Science in English. Both degrees require 42 credits in English courses beyond the first-year English composition sequence. The B.A. degree requires functional proficiency in at least one language other than English, which is typically acquired by 14 credits of coursework (see Bachelor of Arts Requirement using a Second Language (p. 45)); the B.S. degree requires a minor in an area other than English.

The Department of English partners with the School of Education (<https://www.ndsu.edu/education>) to offer a Bachelor of Arts degree and a Bachelor of Science degree in English Education (grades 7-12) through the College of Human Development and Education (<https://www.ndsu.edu/hde>). The B.A. in English Education requires 39 credits in English courses beyond the first-year English composition sequence; functional proficiency in at least one language other than English, which is typically acquired through 14 credits of coursework (see Bachelor of Arts Requirement using a Second Language (p. 45)); 34 credits in Education courses; and elective credits to total 122 credits. The B.S./Communication Option leads to certification in both English and Speech and requires 39 credits of English courses beyond the first-year English composition sequence, 20 credits of Communication courses, 37 credits of Education courses, and elective credits to total 122 credits.

English Education majors may take additional courses to earn endorsements to teach middle school (grades 5-8) and/or to teach students for whom English is a second Language (ESL). The Middle School Endorsement requires 7 additional credits and the ESL Endorsement requires 10 additional courses for a total of 16 credits (6 of the 16 credits are already included in the English Education degree requirements). English Education majors should contact the English Education adviser or the School of Education (<https://www.ndsu.edu/education>) for additional information.

Students must earn a grade of 'C' or above in all courses used to fulfill requirements for the English major. These courses may be repeated only once.

English (p. 191)

English

The English Department offers a diverse set of courses in literature, writing studies, linguistics, film, and English Education. English majors form strong communication skills, learn effective research methods, develop flexibility in facing complex situations, and increase their awareness of the humanities tradition. These ideals suit both the liberal arts major and the practical, pre-professional student. Success in an information economy is dependent upon

one's ability to produce, analyze, understand, and restate written, oral, and visual material. Through its offerings, the department continues the rich tradition of language and literature study while it also responds to the needs of today's students.

The department teaches and values collaboration among its students, and seeks out collaborations for itself at NDSU. The department contributes to the Humanities major (p. 203), the Scholars Program, and the Women and Gender Studies minor (p. 259). Moreover, the department supports the Cooperative Education Program (<https://www.ndsu.edu/career/internshipprogram>) and welcomes efforts to create student internships. The department serves the university's students through the General Education Writing Curriculum and it welcomes and encourages double majors and minors.

The English Department offers a Bachelor of Arts degree and a Bachelor of Science degree in English. Both English degrees require 42 credits in English courses beyond the first-year English composition sequence. The B.A. degree requires functional proficiency in at least one language other than English, which is typically acquired through 14 credits of coursework (see Bachelor of Arts Requirement using a Second Language (p. 45)); the B.S. degree requires a minor in an area other than English.

The Department of English partners with the School of Education (<https://www.ndsu.edu/education>) to offer a Bachelor of Arts and a Bachelor of Science degree in English Education through the College of Human Development and Education (p. 365). The B.A. in English Education requires 39 credits in English courses beyond the first-year English composition sequence, functional proficiency in at least one language other than English, which is typically acquired through 14 credits of coursework (see Bachelor of Arts Requirement using a Second Language (p. 45)), 34 credits in Education courses, and elective credits to total 122 credits. The B.S./Communication Option leads to certification in both English and Speech and requires 39 credits of English courses beyond the first-year English composition sequence, 20 credits of Communication courses, 37 credits of Education courses, and elective credits to total 122 credits.

English Education majors may take additional courses to earn endorsements to teach middle school (grades 5-8) and/or to teach students for whom English is a second Language (ESL). The Middle School Endorsement requires 7 additional credits, and the ESL Endorsement requires 10 additional credits for a total of 16 credits (6 of the 16 credits are included in the English Education degree requirements). English Education majors should contact the English Education adviser or the School of Education for additional information.

Students must earn a grade of 'C' or above in all courses used to fulfill requirements for the English major. These courses may be repeated only once.

Major Requirements

Major: English

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list.		10
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Humanities & Fine Arts (A):		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

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.

General Education Requirements		40
AH&SS College Requirement		9
Major Requirements		
ENGL 167	Introduction to English Studies	3
ENGL 271	Literary Analysis	3
ENGL 275	Introduction to Writing Studies	3
ENGL 467	English Studies Capstone Experience	3
Literature Survey Courses:		
Select one of the following:		3
ENGL 240	World Literature Masterpieces	
ENGL 315	British Literature I	
ENGL 317	American Literature I	
Select one of the following:		3
ENGL 316	British Literature II	
ENGL 318	American Literature II	
Cultural Diversity Courses:		
Select two of the following:		6
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENGL 336	Literature and The Environment	
ENGL 340	19th Century American Fiction	
ENGL 341	20th Century American Fiction	
ENGL 345	Themes in American Culture	
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		
ENGL	300-400 Level Courses	6

ENGL	400 Level Courses	9
Degree Requirements: Potential of 34 credits to reach 122		34
Total Credits		122

English Minor - Literature (p. 194)

English Minor - Writing (p. 195)

English Minor - Literature

Minor Requirements

English - Literature Option Minor

Required Credits: 21

Required Course

ENGL 271	Literary Analysis	3
Early Period Literature Survey Course: Select one		3
ENGL 240	World Literature Masterpieces	
ENGL 315	British Literature I	
ENGL 317	American Literature I	
Later Period Literature Survey Courses: Select one		3
ENGL 316	British Literature II	
ENGL 318	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 226		
ENGL 231	The Bible as Literature	
300 Level Coursework:		
ENGL 330	British and American Women Writers	
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	20th Century 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	
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.

English Minor - Writing**Minor Requirements****English - Writing Option Minor****Minor Requirements****Required Credits: 21****Required Course**

ENGL 275	Introduction to Writing Studies	3
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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	British and American Women Writers	
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	20th Century 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.

Great Plains Institute of Food Safety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Food Safety

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	

ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200	Introduction to Food Systems	2-3
or CFS 210	Introduction to Food Science and Technology	
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3

Supporting Courses

BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	3-4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	

Degree Requirements: Potential of a minimum of 36 credits to reach 128. 36

Total Credits

128-135

Minor Requirements**Food Safety Minor****Minor Requirements**

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 7 credits from the following:		7
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	
COMM 486		
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 461	Business Continuity and Crisis Management	
HNES 141	Food Sanitation	
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	

HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory
MICR 350 & 350L	General Microbiology and General Microbiology Lab
MICR 453	Food Microbiology
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
SAFE/COMM 485	Risk and Crisis Communication

Total Credits**16****Minor Requirements and Notes:**

- A minimum of 8 credits must be taken at NDSU

Gerontology

Gerontology

A minor in Gerontology is sponsored through the College of Human Development and Education (<https://www.ndsu.edu/hde>) 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. There are six basic areas of study. Students should follow the directions provided for each of the areas.

Minor Requirements

Gerontology Minor

Minor Requirements

Required Credits: 19

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		
HDFS 182	Wellness and Aging	3
Area Four: Macrosystems		
Select one from the following:		3
HDFS 481	Gender and Aging	
HDFS 482	Family Dynamics of Aging	
Area Five: Internship/Practicum		
A minimum of 4 credits is required for area five.		4
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 481 or HDFS 482	Gender and Aging (the course not used for Area Four: Macrosystems may be used as an elective) Family Dynamics of Aging

Total Credits**19****Minor Requirements and Notes**

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

Department of History, Philosophy, and Religious Studieswww.ndsu.edu/history**Independent Study**

Independent study may be pursued by students wanting to read a special philosophical topic (e.g. aesthetics) or read the work of a particular philosopher. To initiate independent study, the student must contact the department (<https://www.ndsu.edu/history>).

History (p. 200)

Public History (p. 205)

Philosophy-Humanities (p. 203)

Religious Studies (p. 208)

Social Science (p. 209)

History**History Major**

By engaging in the fascinating study of how people in the past understood their worlds, graduates from the Department of History, Philosophy, and Religious Studies will be prepared to comprehend and think critically about the present by understanding how it has been shaped by the past. In their studies they will learn how to evaluate the strengths and weaknesses of alternative explanations for historical events, how to interpret primary and secondary materials to form valid conclusions, how to analyze components of historical events, and how to synthesize and apply their knowledge in an original research project.

The Department of History, Philosophy, and Religious Studies offers both a B.A. and a B.S. degree in History. The B.A. degree requires the completion of two years of a modern language at the college level and is recommended for students desiring a rich liberal arts education or planning for graduate school or law school (see Bachelor of Arts Requirement using a Second Language (p. 45)). The B.S. degree does not have a modern language requirement but, instead, requires an appropriate minor. Students transferring to NDSU must complete at least 50 percent of their history credits at North Dakota State University. A History Education program of study also is offered between the Department of History, Philosophy, and Religious Studies and the School of Education (<https://www.ndsu.edu/education>).

History majors can prepare themselves for careers in secondary education by completing a double major with either a B.A. or B.S. in History with a second major in History Education. The department advises students to choose History as their primary major.

Lists of approved courses for the distribution and sequence requirements and courses recommended for History Education majors are at the department web site (<https://www.ndsu.edu/history>).

History Minor

Students who minor in History are required to complete nine credits of 100-200 level History courses and nine credits of 300-400 level History courses.

Major Requirements**Major: History****Degree Type: B.A. or B.S.****Required Degree Credits to Graduate: 122**

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
HIST 390	Historical Research and Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list.		10
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Humanities & Fine Arts (A):		6
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Category fulfilled with courses taken in Foundational courses.

Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits		40
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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:

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

General Education Requirements	40
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AH&SS College Requirement	9
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History Major Requirements

24 credits must be at the 300-400 level and 20 credits must be taken in residence at NDSU.

Foundation Core: Select 2 courses from the following:	6
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HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
HIST 103	U.S. to 1877	
HIST 104	U.S. Since 1877	

Transitional Courses: Select one course from the following:		3
HIST 135	Race in U.S. History	
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	
HIST 270	American Religious History	
HIST 271	Introduction to Latin American History	
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
HIST 382	Canada	
HIST 421	U.S. History 1763-1829	
HIST 422	U.S. History 1829-1917 I	
HIST 423	U.S. History 1829-1917 II	
HIST 424	U.S. History 1917-Present I	
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 476		
HIST 429		
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 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America 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	
Senior Seminar:		
HIST 489	Senior Seminar (Capstone) *	3
Additional Electives: A minimum of 6 credits of history courses required.		6

Degree Requirements: Potential of 43 credits to reach 122	43
Total Credits	122

* Prerequisite: HIST 390

Minor Requirements

History Minor

Minor Requirements

Required Credits: 18

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.

Philosophy-Humanities

Through interdisciplinary study, students develop an awareness and understanding of the major events and ideas that have shaped the civilization in which they live.

Philosophy-Humanities Major

People have always had questions about the world in which they live. Whether these questions are about truth, beauty, and goodness, or about whether life has any meaning, people find questions to ask. Over the centuries, many minds have addressed these questions. By means of dialogue, intuition, logic, and critical thought, philosophers have created pathways to wisdom and an understanding of the human condition.

North Dakota State University offers students a Philosophy curriculum that may be approached either as a Philosophy-Humanities major or minor.

The Philosophy-Humanities major consists of 30 semester credits. Of these, 21 credits must be taken from the required courses. Nine elective credits, which can be independent studies, complete the major. Each degree has additional university and College of Arts, Humanities and Social Sciences requirements that must be fulfilled. For example, a B.A. requires two years or the equivalent of a foreign language, while the B.S. requires a minor in another field. Please check the university and college pages addressing additional requirements that must be fulfilled.

Philosophy-Humanities Minor

The Philosophy-Humanities minor consists of 21 semester credits: the major required courses plus six elective credits from the elective philosophy courses, including independent studies.

Major Requirements

Major: Philosophy/Humanities

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3

PHIL 450	Metaphysics	3
or PHIL 451	Epistemology	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		10
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. Select from current general education list.		
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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:

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

General Education Requirements		40
AH&SS College Requirement		9
Philosophy/Humanities Major Requirements		
PHIL 101	Introduction to Philosophy	3
PHIL 210	Ethics	3
or PHIL 215	Contemporary Moral Issues	
PHIL 257	Traditional Logic	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:		
PHIL 450	Metaphysics	3
or PHIL 486	Philosophy & Literature	
or PHIL 494	Individual Study	
Philosophy Major Electives		9
Degree Requirements: Potential of 43 credits to reach 122		43
Total Credits		122

Minor Requirements

Philosophy-Humanities Minor

Minor Requirements

Required Credits: 21

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

* May take as an elective if not taken as a required course.

Minor Requirements and Notes

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

Public History

Public History Major

The major requires 51 credits in history courses, including a nine-credit internship. An additional 18 credits in supplementary vocational courses or an approved minor to prepare for a career in public history are also required. The Public History program prepares students for employment in fields such as archives and museums, historical editing, historic preservation, costume conservation, and archeology. The 18 credit supplementary vocational courses are divided into three tracks:

1. Museums, intended to prepare students for work as a curator, interpreter, or administrator in museums,
2. Archives, intended to prepare students for work with documents and/or photographs in a archival repository, and
3. Historical preservation, intended to prepare students to work with the National Historic Preservation legislation to identify historic buildings and sites throughout the nation.

For more details regarding the courses available for the 18 credit distribution courses or 18 credit vocational supplement, refer to the Department of History, Philosophy, and Religious Studies web site (<https://www.ndsu.edu/history>).

Major Requirements

Major: Public History

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3

HIST 390	Historical Research and Writing	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list.		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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:

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

Note: Thirty-three (33) credits must be taken in residence at NDSU.

General Education Requirements		40
AH&SS College Requirement		9
Public History Major Requirements		
HIST 251	Introduction To Public History	3
HIST 252	Introduction to Museum Work	3
HIST	100-200 level elective	3
ARCH 322	History of Architecture II	3
HIST 390	Historical Research and Writing	3
HIST 401	Archival Theory and Practice	3
HIST 403	Archival Preservation	3
HIST 496	Field Experience (Approved Internship)	9
HIST 489	Senior Seminar (Capstone)	3
Distribution Requirement: Minimum credit required for each distribution area.		
North American History: Select 6 credits from the following:		6
HIST 382	Canada	
HIST 422	U.S. History 1829-1917 I	
HIST 423	U.S. History 1829-1917 II	
HIST 424	U.S. History 1917-Present I	
HIST 425	U.S. History 1917-Present II	
HIST 429		

HIST 431	The North American Plains	
HIST 434	Environmental History	
HIST 436	American Frontier to 1850	
HIST 437	American West Since 1850	
HIST 476		
European History: Select 6 credits from 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 from the following:		6
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America 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 485	Cultural Exchange and the Making of the Modern World	
Supplementary Vocational Option (see below):		18
An additional 18 credits are required from the vocational options listed below. Select a minimum of 18 credits from one specific track: 1) Museums, 2) Archives, or 3) Historic Preservation. Students may substitute a minor program from another field of study approved by the Director of Public History Program (e.g., Business Administration, Mass Communications, or Sociology with an Anthropology emphasis)		
Degree Requirements: Potential of 4 credits to reach 122		4
Total Credits		122
Supplementary Vocational Options		
Select a minimum of 18 credits from one vocational track.		
Museums: Select 18 credits from the following:		18
ADHM 310	History of Fashion	
ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	
ANTH 111	Introduction to Anthropology	
ANTH 204	Archaeology and Prehistory	
ART 211	Art History II	
ART 451	History of American Art	
ART 452	Contemporary Art	
COMM 260	Introduction to Web Design	
COMM 261	Introduction to Web Development	
CSCI 116	Business Use of Computers	
ENGL 320	Business and Professional Writing	
ENGL 459	Researching and Writing Grants and Proposal	

SOC 405	Community Development	
Total Credits		18

Archives Course List

Archives: Select 18 credits from the following: 18

MIS 320	Management Information Systems	
COMM 260	Introduction to Web Design	
COMM 261	Introduction to Web Development	
CSCI 116	Business Use of Computers	
ENGL 320	Business and Professional Writing	
ENGL 459	Researching and Writing Grants and Proposal	
Total Credits		18

Historic Preservation Course List

Historic Preservation: Select 18 credits from the following: 18

ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	
ANTH 111	Introduction to Anthropology	
ANTH 204	Archaeology and Prehistory	
ART 451	History of American Art	
CSCI 116	Business Use of Computers	
ENGL 320	Business and Professional Writing	
ENGL 459	Researching and Writing Grants and Proposal	
LA 322	History of Landscape Architecture	
SOC 405	Community Development	
Total Credits		18

Religious Studies

Religious Studies

From 1932 to 1977 the School of Religion was independent from the university but in close association with it. Currently, Religion Studies continues as a part of the College of Arts, Humanities and Social Sciences.

Religious Studies Minor

A minor in Religious Studies is available. The minor consists of 20 credits of which 12 credits may be at the 100-200 level and eight credits must be at the 300-400 level. For advice on the distribution of the remainder of the electives, consult with the department.

Minor Requirements

Religious Studies Minor

Minor Requirements

Required Credits: 20

Required Minor Courses

RELS	100-200 level courses	12
RELS	300-400 level courses	8

Total Credits 20

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- For advice on the distribution of electives consult with an adviser from the department.

Social Science

Social Science Major

A special interdisciplinary Social Science major is available. It includes courses from disciplines such as history, economics, political science, geography, psychology, sociology, or anthropology. Students can obtain the appropriate curriculum guides from the School of Education (<https://www.ndsu.edu/education>), Office of Registration and Records (<https://www.ndsu.edu/registrar>), or the Arts, Humanities and Social Sciences Dean's Office (https://www.ndsu.edu/ahss/contact_us).

Before taking advanced course work required for the Social Science major, the student should complete at least one year in each of the required disciplines. In addition, students should complete course work in economics and world history.

Students who wish to prepare for high school teaching should make this intention known to the School of Education before entering their junior year to ensure that state teacher certification requirements are met.

Major Requirements

Major: Social Science

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL	One course in Upper Level Writing: Select from current general education list	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S): 10

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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
or ECON 202	Principles of Macroeconomics	
Select from current general education list		3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

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:

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

General Education Requirements	40
AH&SS College Requirement	9
Social Science Major Requirements	
History	6
US HIST at 400 level	
Psychology	6
PSYC at 300-400 Level	
Sociology	6
SOC at 300-400 Level	
Political Science: Select 2 from the following:	6
POLS 420	6
Political Behavior-Executive-Legislative Process	
POLS 421	6
Political Behavior-Political Parties	
POLS 422	6
State and Local Politics	
Economics:	
ECON 201	3
Principles of Microeconomics	
or ECON 202	3
Principles of Macroeconomics	
Geography:	6
Social Science	0-2
Elective	
Senior Capstone Experience	1-3
The Senior Capstone experience must be completed in one of the following departments: HISTORY, ECONOMICS, POLITICAL SCIENCE, PSYCHOLOGY OR SOCIOLOGY / ANTHROPOLOGY. A capstone course completed for a second major in History, Political Science, Psychology or Sociology / Anthropology can be used to satisfy the Social Science major capstone requirement.	
Degree Requirements: Potential of 39 credit to reach 122	39
Total Credits	122-126

Department of Modern Languages

www.ndsu.edu/modernlanguages

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, with courses in German, Arabic, and Latin. 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. 69), NDSU students may also study Chinese, Japanese, Norwegian, and classics for full credit.

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. 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 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.

French (p. 211)

German Language Studies (p. 214)

Spanish (p. 215)

French

Major Requirements

Major: French

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
FREN 360	Studies in Language and Style	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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:

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.

General Education Requirements 40

AH&SS College Requirement 9

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
FREN 401	Approaches to Literature	3

Elective Courses: Select four of the following: 12

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 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 current list of approved ancillary electives. Western Civilization, History of Europe or Africa, World Literature, or any area of linguistics. Courses selected from current General Education course list may count here.		
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.)	1-15
FREN 489	Senior Thesis (Consult dept/adviser semester before enrolling)	1
Degree Requirements: Potential of 38 credits to reach 122		38
Total Credits		122-136

Minor Requirements

French Minor

Minor Requirements

Required Credits: 18

- A minimum grade of B is required for all courses used for the French minor.

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 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, FREN 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.

Minor Requirements

French Studies Minor

Minor Requirements

Required Credits: 18

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.

German Language 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 civilization study beyond the intermediate level (GERM 311, GERM 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.

Minor Requirements

German Studies Minor

Minor Requirements

Required Credits: 18

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.

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 (Spanish, French or German 311, 312 and a culture 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.

Minor Requirements

German Studies Minor

Minor Requirements

Required Credits: 18

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.

Spanish

Major Requirements

Major: Spanish

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
SPAN 401	Advanced Spanish Grammar and Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S): 10

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. Select from current general education courses.

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list	6
Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	40

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:

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.

General Education Requirements	40	
AH&SS College Requirement	9	
Spanish Major Core Requirements		
SPAN 311	Spanish Conversation and Composition I	3
SPAN 312	Spanish Conversation and Composition II	3
Advanced Language:		
SPAN 401	Advanced Spanish Grammar and Writing	3
or SPAN 402	Advanced Spanish Conversation	
Civilization:		
SPAN 330	Introduction to Spanish Civilization	3
or SPAN 331	Introduction to Spanish American Civilization	
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..		
Additional Courses:		9
Select from the following and any course not used above:		

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
Degree Requirements: Potential of 44 credits to reach 122		44
Total Credits		122-136

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

Spanish Minor

Minor Requirements

Required Credits:18

A minimum grade of 'B' is required for all courses used for the Spanish minor.

Minor 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 401	Advanced Spanish Grammar and Writing	3
or SPAN 402	Advanced Spanish Conversation	

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 Language 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.

Minor Requirements

Spanish Studies Minor

Minor Requirements

Required Credits: 18

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:

ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	3
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.

Challey School of Music

www.ndsu.edu/performingarts/

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, 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

NDSU Challey School of Music sponsors a large variety of ensembles including the NDSU Wind Symphony, Concert Choir, 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. NDSU students may also register for the University Symphony Orchestra, a jointly-sponsored ensemble with Minnesota State University Moorhead. 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 recreational ensembles.

Music Curricula

Requirements are grouped by degree. Please refer also to graduation requirements listed in the Academic Policies (p. 44) section of this publication. The information in this Bulletin may be superseded by information updated regularly and provided by the Challey School of Music.

Performance (p. 228)

Music Education (p. 224)

Music (p. 219)

Music

B.A. or B.S. with a Major in Music

Majors interested in a general liberal arts degree pursue either the Bachelor of Arts or the Bachelor of Science degree. The B.A. degree includes a functional proficiency in at least one language other than English. The B.S. degree requires students to complete a minor program of study.

Music Minor

Two minors are available - one for the general student and one specifically designed for the education major. Music majors cannot declare music minors.

Major Requirements

Major: Music

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358 or ENGL 322	Writing in the Humanities and Social Sciences Writing and the Creative Process	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S): 10

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. Select from current general education list.

Humanities & Fine Arts (A):

MUSC 103	Introduction to Music History	3
Select from current general education list		3

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	40

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:

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.

General Education Requirements		40
AH&SS College Requirements		9
Music Core Requirements		25
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 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:)		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 306	Concert Choir	
Music Electives or Emphasis Courses		15
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
Degree Requirements: 20 credits to reach 122 credits		20
B.A. Second year language proficiency at college level required		
B.S. - The completion of a minor program of study, a second major, or a second degree is required		

Total Credits**122**

- * 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.

Two minors available:**Music** (p. 222)**Music Education** (p.)**Minor Requirements****Music Minor****Minor Requirements****Required Credits: 20****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.

Minor Requirements**Music Education Minor****Minor Requirements****Required Credits: 19****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

Minor Requirements

Required Credits: 23

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

Vocal Music Education Minor

Minor Requirements

Required Credits: 19

Required Minor 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
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	3
MUSC 163	Voice Class for Instrumentalists	
Music Education Practicum		
MUSC 482	Choral Music Methods	2
Total Credits		20

The Bachelor of Music in Music Education (B.Mus.)

Certification in Music Education

Students must complete the School of Education (<https://www.ndsu.edu/education>) requirements, complete the common 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.

Major Requirements

Major: Music Education - Instrumental Music Track

Degree Type: B.Mus

Required Degree Credits to Graduate: 143

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358 or ENGL 322	Writing in the Humanities and Social Sciences Writing and the Creative Process	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		10
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. Select from current general education list.		
Humanities & Fine Arts (A):		
MUSC 103	Introduction to Music History	3
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
HDFS 230 or PSYC 250	Life Span Development Developmental Psychology	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

Major 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 grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
General Education Requirements		40
Music Core Requirements for Education Majors		54
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 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 & Techniques	2
or MUSC 358	Jazz Methods	
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		28
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		24
Major Intrumental 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 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 304	University Symphony Orchestra	
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
Performance Attendance: Must enroll in the following for 5 different semesters:		
MUSC 180	Performance Attendance	0

Applied Major Instrument: All students enrolled in applied instruction must participate in a major ensemble specific to their area. Select from the following: 7

MUSC 165	Applied Piano
MUSC 168	Applied Wind Instruments
MUSC 169	Applied Percussion Instruments
MUSC 170	Applied Upper Strings
MUSC 171	Applied Lower Strings
MUSC 172	Applied Guitar
2 semesters each of 100 level, 200 level, and 300 level	
One semester of 400 level	

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

Total Credits 143

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

Required Degree Credits to Graduate: 139

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 322	Writing and the Creative Process	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A):		
MUSC 103	Introduction to Music History	3
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
HDFS 230	Life Span Development	3

or PSYC 250	Developmental Psychology	
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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
General Education Requirements		40
Music Core Requirements for Education Majors		54
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 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	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		28
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		22
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 311	Jazz Ensemble	
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
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**139**

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.

The Bachelor of Music (B.Mus.) in Performance

The professional undergraduate degree in music, the B.Mus. in performance is designed for students pursuing careers as performing musicians. Such students often continue advanced study in graduate school. All students audition for the appropriate area of performance with faculty members and demonstrate professional level skills or potential. In addition to college and university requirements, all students take courses in the core requirements section, and then select a specialized curriculum under instrumental, voice or piano. Bachelor of Music students are required to pass all four levels of piano proficiency examinations prior to completion of the degree. Piano credit requirements listed below may be waived in whole or in part upon successful completion of the piano proficiency examinations.

Instrumental (p. 229)

Piano (p. 231)

Vocal (p. 233)

Music Instrumental

Major Requirements

Major: Music - Instrumental Performance

Degree Type: B.Mus

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358 or ENGL 322	Writing in the Humanities and Social Sciences Writing and the Creative Process	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S): 10

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. Select from current general education list.

Humanities & Fine Arts (A): Category fulfilled with courses taken within the major

MUSC 103	Introduction to Music History	3
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Select from current general education list 3

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

Major Requirements

A grade of 'C' or better is required in all MUSC prefix courses.

General Education Requirements 40

Music Core Requirements 35

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 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	Applied Wind Instruments	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 268	Applied Wind Instruments	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 368	Applied Wind Instruments	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 468	Applied Wind Instruments	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Percussion:		
MUSC 169	Applied Percussion Instruments	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 269	Applied Percussion Instruments	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 369	Applied Percussion Instruments	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 469	Applied Percussion Instruments	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Upper Strings:		
MUSC 170	Applied Upper Strings	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 270	Applied Upper Strings	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 370	Applied Upper Strings	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 470	Applied Upper Strings	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Lower Strings:		
MUSC 171	Applied Lower Strings	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 271	Applied Lower Strings	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 371	Applied Lower Strings	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 471	Applied Lower Strings	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Guitar:		
MUSC 172	Applied Guitar	1
MUSC 173	Supplementary Applied Study (1-2 credits)	
MUSC 272	Applied Guitar	1
MUSC 273	Supplementary Applied Study (1-2 credits)	
MUSC 372	Applied Guitar	1
MUSC 373	Supplementary Applied Study (2-3 credits)	
MUSC 472	Applied Guitar	1
MUSC 473	Supplementary Applied Study (3-4 credits)	
Instrumental Track		26

MUSC 331	Instrumental Arranging	2
MUSC 344	Wind Band Literature	2
MUSC 441	Symphonic Literature	2
Applied Piano: Class or individual study		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	
Jazz Studies: Select 4 credits from the following:		4
MUSC 311	Jazz Ensemble	
MUSC 358	Jazz Methods	
MUSC 364	Jazz Improvisation	
Major Ensemble: Select 8 credits from the following:		8
MUSC 303	Wind Symphony (or as approved by adviser)	
Minor Ensembles: Select 4 credits from the following:		4
MUSC 111	Marching Band	
MUSC 112	University Band	
MUSC 304	University Symphony Orchestra	
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		
Performance Attendance: Must enroll 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		122

Degree Notes

- Music majors may not declare a music minor.

Music Piano

Major Requirements

Major: Music - Piano Performance

Degree Type: B.Mus.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 322	Writing and the Creative Process	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A): Category to be fulfilled with courses from the major

MUSC 103	Introduction to Music History	3
Select from current general education list		3

Social & Behavioral Sciences (B): Select from current general education list 6**Wellness (W): Select from current general education list** 2**Cultural Diversity (D): Select from current general education list****Global Perspectives (G): Select from current general education list****Total Credits** 40**Major Requirements**

A grade of 'C' or better is required in all MUSC prefix courses.

General Education Requirements 40**Music Core Requirements** 35

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 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 25

MUSC 443	Keyboard Literature	3
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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	
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MUSC 322	Jazz Combo	
MUSC 358	Jazz Methods	
MUSC 364	Jazz Improvisation	
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 303	Wind Symphony	
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 2 credits from the following:		2
MUSC 319	Opera Workshop	
MUSC 321	Piano Chamber Music	
MUSC 384	Composition I	
MUSC 484	Composition II	
MUSC 494	Individual Study	
Performance Attendance: Must enroll in 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		122

Degree Notes

- Music majors may not declare a music minor.

Music Vocal

Major Requirements

Major: Music - Vocal Performance

Degree Type: B.Mus

Required Degree Credits to Graduate: 136

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 322	Writing and the Creative Process	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

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. Select from current general education list 10

Humanities & Fine Arts (A): Category to be fulfilled with courses taken for the major

MUSC 103	Introduction to Music History	3
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Select from current general education list 3

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list**Global Perspectives (G): Select from current general education list****Total Credits****40****Major Requirements**

A grade of 'C' or better is required in all MUSC prefix courses.

General Education Requirements

40

Music Core Requirements

35

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 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

42

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
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		
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
Total Credits		136

Degree Notes

- Music majors may not declare a music minor.

Department of Sociology and Anthropology

www.ndsu.edu/socanth

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>).

Anthropology (p. 235)

Sociology (p. 238)

Community Development (p. 237)

Anthropology

Anthropology is the study of the human condition and experience over both time and space. It sets itself apart from other social sciences in its holistic aspiration to understand all aspects of humankind: past, present and future; cultural and biological. This holistic approach is reflected in the primary subdisciplines of study including archaeology, cultural anthropology and sociolinguistics, physical anthropology, and applied anthropology. Anthropology is both the study and celebration of the diversity of human lifeways, reminding us that despite our different cultures, we are all members of the human family and share a common nature and a common destiny.

The primary concern across subdisciplines and geographical areas at NDSU is with human heritage—material and intangible, past, present and future. Our focal geographical areas include North America, Latin/America and the Caribbean, and Oceania with other areas of the world represented throughout the curriculum.

Major Requirements

Major: Anthropology

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list	3
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Science & Technology (S):	10
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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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G): Select from current general education list	
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Total Credits	40
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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:

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

General Education Requirements	40
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AH&SS College Requirement	9
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Anthropology Core Requirements	
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SOC 110	Introduction to Sociology	3
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ANTH 111	Introduction to Anthropology	3
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200 Level Core: Select two of the following:	6
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ANTH 204	Archaeology and Prehistory	
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ANTH 205	Human Origins	
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ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
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*Theory:	3
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ANTH 470	Analysis & Interpretation in Archaeology	
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or ANTH 480	Development of Anthropological Theory	
*Methods:		3
ANTH 471	Archaeological Research Methods	
or ANTH 481	Qualitative Methods in Cultural Anthropology	
Senior Capstone:		
ANTH 489	Senior Capstone In Anthropology	1
Major Electives 300-400 Level:		18
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.		
Degree Requirements: Potential of 36 credits to reach 122		36
Total Credits		122

* 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.

Minor Requirements

Anthropology Minor

Minor Requirements

Required Credits: 18

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.

Community Development

Community Development Minor

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 that includes coursework and an experiential component. Requirements include SOC 404 Community Assessment and SOC 405 Community Development and a minimum of three credits in each of the following areas: economics, business, and social science.

Minor Requirements

Community Development Minor

Minor Requirements

Required Credits: 18

Required Courses

SOC 404	Community Assessment	3
SOC 405	Community Development	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)	

Total Credits**18**

Minor Requirements and Notes

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

Sociology

Sociology is the scientific study of social structure, social inequality, social change, and social interaction that comprise societies. The sociological perspective examines the broad social context in which people live. This context shapes our beliefs and attitudes and sets guidelines for what we do.

The curriculum is structured to introduce majors to the sociology discipline and provide them with conceptual and practical tools to understand social behavior and societies. Areas of study include small groups, populations, inequality, diversity, gender, social change, families, community development, organizations, medical sociology, aging, and the environment.

The 38-credit requirement includes the following core:

ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
SOC 340	Social Research Methods ¹	3
SOC 341	Social Research Methods Laboratory	1
SOC 422	Development Of Social Theory	3
SOC 489	Senior Capstone In Sociology	1
Gateway Courses	Majors must complete the following four courses:	12
SOC 115 or SOC 116	Social Problems Global Social Problems	
SOC 214	Social Interaction	
SOC 233	Sociology of Organizations and Work	
SOC 235	Cultural Diversity	
SOC Electives	Sociology Electives	12
Total Credits		38

¹ An introductory statistics course is a prerequisite for SOC 340 Social Research Methods

Major Requirements

Major: Sociology

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list.

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3

Wellness (W): Select from current general education list		2
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Cultural Diversity (D):

ANTH 111	Introduction to Anthropology	3
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Global Perspectives (G): Select from current general education list

Total Credits	40
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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:

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

General Education Requirements	40	
AH&SS College Requirement	9	
Sociology Core Requirements (includes ANTH 111, SOC 110, & STAT 330)		
SOC 340	Social Research Methods	3
SOC 341	Social Research Methods Laboratory	1
SOC 422	Development Of Social Theory	3
SOC 489	Senior Capstone In Sociology	1
Core Perspective Courses	See areas listed below	21
Students are REQUIRED to complete the anchor course from each area plus an additional 9 credits from any of the four areas.		
Degree Requirements: Potential of 44 credit to reach 122		44
Total Credits		122

Core Perspective Courses

Completion of the anchor course from each area plus an additional 9 credits from any of the four areas is required to complete the core perspectives requirement.

Area One: Social Structure

SOC 233	Sociology of Organizations and Work (ANCHOR)	3
SOC 401	Sociology of Religion	3
SOC 404	Community Assessment	3
SOC 417	Sociology of the Family	3
SOC 426	Sociology of Medicine	3
SOC 427	Public Health Law and Policy for Non-urban, Rural and Frontier Areas	3
SOC 443	International Disasters	3
SOC 465	Applied Demographics	3

Area Two: Social Inequality

SOC 235	Cultural Diversity (ANCHOR)	3
SOC 410	Social Inequality	3
SOC 412	Sociology of Gender	3
SOC 424	Feminist Theory and Discourse	3
SOC 445	Special Populations in Disasters	3

Area Three: Social Change

SOC 115	Social Problems (ANCHOR) <small>Either course serves as the anchor</small>	3
or SOC 116	Global Social Problems	
SOC 403	Sociology of The Great Plains	3
SOC 405	Community Development	3
SOC 407	Deviant Behavior	3
SOC 431	Environmental Sociology	3
SOC 439	Social Change	3
SOC 440	Sociology of Aging	3

Area Four: Social Interaction

SOC 214	Social Interaction (ANCHOR)	3
SOC 416	Sociology Through Literature	3
SOC 418	Social Psychology	3
SOC 441	Death and Dying	3

Total Credits **12**

Minor Requirements**Sociology Minor****Minor Requirements**

Required Credits: 18

Core Courses

ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3

Required Courses: Select two of the following: **6**

SOC 115	Social Problems	
or SOC 116	Global Social Problems	
SOC 214	Social Interaction	
SOC 233	Sociology of Organizations and Work	
SOC 235	Cultural Diversity	

Major Electives: Select any two sociology 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).

Department of Theatre Arts

www.ndsu.edu/finearts/theatre

Programs of study in Theatre Arts lead to the Bachelor of Science, Bachelor of Arts, and Bachelor of Fine Arts degrees. 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.

LCT Productions, previously known as Little Country Theatre, has been an important part of campus life at NDSU since 1914. LCT Productions consists of **Theatre NDSU**, the student-run **newfangled theatre company**, and the improv company, **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 LCT 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 LCT production per semester. Participation in LCT is open to all NDSU students regardless of major.

The Department of Theatre Arts is accredited by the National Association of Theatre Schools (NAST). It is also an active participant in the Kennedy Center American College Theatre Festival (KCACTF), 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.

Theatre Arts (p. 242)

Theatre Arts

B.F.A. Design & Tech Theatre Track (p. 243)

B.F.A. Musical Theatre (p. 245)

B.F.A. Performance (p. 246)

Theatre Arts/B.A. or B.S. (p. 248)

Minor Requirements

Theatre Arts Minor

Required Credits: 23

Theatre Arts

Theatre Appreciation: Select 2 of the following:

6

THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 181	Dramatic Literature & Style II	
THEA 280	World Theatre	

Theatre Practicum

THEA 205	Backstage Practicum (take 2 times)	2
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Electives: Select 15 credits from the following:

15

THEA 161	Acting I	
THEA 228	Development of Musical Theatre	
THEA 261	Acting II	
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 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 278	Introduction to Design: Scenic Design	
THEA 279	Scenic Painting	
THEA 362	Dance Styles for Theatre (repeatable up to 3 cr)	
THEA 365	Directing I	

THEA 399	Special Topics (repeatable up to 3 cr)	
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Total Credits**23****Minor Requirements and Notes**

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

Minor Requirements**Theatre Arts with Dance Minor****Required Credits: 23****Theatre Arts with Dance Emphasis**

Theatre Appreciation: Select 2 of the following:

6

THEA 110	Introduction to Theatre Arts	
THEA 180	Dramatic Literature and Style I	
THEA 181	Dramatic Literature & Style II	
THEA 280	World Theatre	

Theatre Practicum

THEA 205 Backstage Practicum (take 2 times)

2

Electives: Select 15 credits from the following:

15

THEA 161	Acting I	
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)	
THEA 363	Dance Studio II (can take up to 6 times)	

Total Credits**23****Minor Requirements and Notes**

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

Design & Tech Theatre Track**Major Requirements****Major: Theatre Arts - Design & Tech Theatre Track**

Degree Type: B.F.A.

Required Degree Credits to Graduate: 127

General Education Requirements**First Year Experience (F):**

UNIV 189 Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.) 1

Communication (C):

ENGL 110 College Composition I 3

ENGL 120 College Composition II 3

One Course in Upper Level Writing. Select one of the following: 3

ENGL 320 Business and Professional Writing

ENGL 322 Writing and the Creative Process

ENGL 323 Creative Writing

ENGL 358 Writing in the Humanities and Social Sciences

ENGL 459 Researching and Writing Grants and Proposal

COMM 110 Fundamentals of Public Speaking 3

Quantitative Reasoning (R): Select from current general education list

3

Science & Technology (S):

10

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. Select from current general education list.

Humanities & Fine Arts (A):		
ART 111	Introduction to Art History	3
MUSC 100	Music Appreciation	3
or MUSC 103	Introduction to Music History	
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
THEA 280	World Theatre	3
Global Perspectives (G):		
ART 111	Introduction to Art History	3
Total Credits		40

Major Requirements

General Education Requirements		40
Professional Major Requirements		
Students must earn a minimum grade of a 'C' in all THEA prefix courses.		
THEA 161	Acting I	3
THEA 150	Theatre Foundations I	1
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 250	Theatre Foundations II	1
THEA 270	Stagecraft *	3
THEA 271	Costume Craft *	3
THEA 272	Drawing for the Theatre *	3
THEA 275	Theatrical Makeup Design *	3
THEA 276	Lighting and Sound Design for the Theatre *	3
THEA 277	Costume Design for the Theatre *	3
THEA 278	Introduction to Design: Scenic Design *	3
THEA 279	Scenic Painting *	3
THEA 280	World Theatre	3
THEA 350	Theatre Foundations III ¹	1
THEA 365	Directing I	3
THEA 370	Technical Theatre Production (take 2 times) *	6
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 481	History and Literature of the Theatre II	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:		
ART 131	Foundations Drawing	3
ENGL 380	Shakespeare	3
Total Credits		127

* Students must earn a minimum grade of a 'B' in these Design and Technology courses.

¹ Seminar course for third year Theatre majors.

Musical Theatre

Major Requirements

Major: Theatre Arts - Musical Theatre Track

Degree Type: B.F.A.

Required Degree Credits to Graduate: 146

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A):

ART 111	Introduction to Art History	3
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MUSC 100	Music Appreciation	3
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or MUSC 103	Introduction to Music History	
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D):

THEA 280	World Theatre	3
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Global Perspectives (G):

ART 111	Introduction to Art History	3
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Total Credits		40
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Major Requirements

Students must earn a minimum grade of a 'C' in all THEA or MUSC prefix courses.

General Education Requirements		40
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Professional Major Requirements

MUSC 130	Theory and Analysis I	3
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MUSC 131	Theory and Analysis II	3
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MUSC 132	Ear Training & Sight Singing I	1
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MUSC 133	Ear Training & Sight Singing II	1
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MUSC 160	Piano Class I	1
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MUSC 167	Applied Voice (2 credits in different semesters)	2
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MUSC 267	Applied Voice (2 credits in different semesters)	2
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MUSC 273	Supplementary Applied Study	1
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MUSC 367	Applied Voice (2 credits in different semesters)	2
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MUSC 467	Applied Voice	1
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MUSC 480	Recital	1
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THEA 161	Acting I *	3
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 228	Development of Musical Theatre *	3
THEA 261	Acting II *	3
THEA 263	Dance Studio (take one each of Jazz, Ballet, Tap) *	6
THEA 266	Voice and Movement for the Actor *	3
THEA 268	Acting the Song I	3
THEA 270	Stagecraft	3
THEA 271	Costume Craft	3
THEA 275	Theatrical Makeup Design	3
Select one of the following:		3
THEA 274	Introduction To Stage Design	
THEA 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 362	Dance Styles for Theatre *	1
THEA 363	Dance Studio II (take one each of Jazz, Ballet, Tap) *	6
THEA 365	Directing I	3
THEA 368	Business of Acting	3
THEA 450	Capstone Experience	3
THEA 466	Advanced Voice for the Actor *	3
THEA 467	Advanced Movement for the Actor *	3
THEA 468	Acting the Song II	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
Theatre Practice - 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable 1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (Repeatable - 2 credits)	
Related Area:		
ENGL 380	Shakespeare	3
THEA 150	Theatre Foundations I	1
THEA 250	Theatre Foundations II	1
THEA 350	Theatre Foundations III	1
Total Credits		146

* Students must earn a minimum grade of 'B' in these music, dance and performance courses.

Performance Track

Major Requirements

Major: Theatre Arts - Performance Track

Degree Type: B.F.A.

Required Degree Credits to Graduate: 129

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	

ENGL 322	Writing and the Creative Process	
ENGL 323	Creative Writing	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A):		
ART 111	Introduction to Art History	3
MUSC 100	Music Appreciation	3
or MUSC 103	Introduction to Music History	
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
THEA 280	World Theatre	3
Global Perspectives (G):		
ART 111	Introduction to Art History	3
Total Credits		40

Major Requirements

Students must earn a minimum grade of a 'C' in all THEA prefix courses.

General Education Requirements		40
Professional Major Requirements		
THEA 161	Acting I *	3
MUSC 162	Voice Class	1
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 261	Acting II *	3
THEA 262	Introduction to Dance *	2
THEA 263	Dance Studio (take 2 times) *	4
THEA 266	Voice and Movement for the Actor ¹	3
THEA 270	Stagecraft	3
THEA 271	Costume Craft	3
THEA 275	Theatrical Makeup Design	3
Select one of the following:		3
THEA 228	Development of Musical Theatre *	
THEA 267	Acting for the Camera	
Select one of the following:		3
THEA 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 278	Introduction to Design: Scenic Design	
THEA 280	World Theatre	3
THEA 361	Acting III: Advanced Realism *	3
THEA 362	Dance Styles for Theatre *	1
THEA 365	Directing I	3
THEA 368	Business of Acting *	3
THEA 450	Capstone Experience	3
THEA 461	Acting Shakespeare *	3
THEA 462	Acting Styles *	3
THEA 466	Advanced Voice for the Actor *	3

THEA 467	Advanced Movement for the Actor *	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
Theatre Practice - Repeatable for 12 credits:		12
THEA 210	Theatre Practicum (1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Related Area:		
ENGL 380	Shakespeare	3
THEA 150	Theatre Foundations I	1
THEA 250	Theatre Foundations II	1
THEA 350	Theatre Foundations III	1
Total Credits		129

* Students must earn a minimum grade of 'B' in these dance and performance courses.

Theatre Arts BA-BS

Major Requirements

Major: Theatre Arts

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A):

ART 111	Introduction to Art History	3
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MUSC 100	Music Appreciation	3
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or MUSC 103	Introduction to Music History	
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D):		
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THEA 280	World Theatre	3
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Global Perspectives (G):

ART 111	Introduction to Art History	3
Total Credits		40

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:

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.

General Education Requirements		40
AH&SS College Requirement		9
Professional Major Requirements		
THEA 150	Theatre Foundations I	1
THEA 161	Acting I	3
THEA 180	Dramatic Literature and Style I	3
THEA 181	Dramatic Literature & Style II	3
THEA 250	Theatre Foundations II	1
THEA 270	Stagecraft	3
THEA 271	Costume Craft	3
THEA 275	Theatrical Makeup Design	3
or THEA 279	Scenic Painting	
THEA 280	World Theatre	3
THEA 350	Theatre Foundations III	1
THEA 365	Directing I	3
THEA 450	Capstone Experience	3
THEA 480	History and Literature of Theatre I	3
THEA 481	History and Literature of the Theatre II	3
Select one of the following:		3
THEA 276	Lighting and Sound Design for the Theatre	
THEA 277	Costume Design for the Theatre	
THEA 278	Introduction to Design: Scenic Design	
Practicum- 12 credits from the following:		12
THEA 210	Theatre Practicum (Repeatable, 1-2 credits)	
THEA 211	Stage Management Practicum and Seminar (2 credits)	
Electives: Select nine credits from the following:		9
THEA 160	Storytelling	
THEA 260	Theatre for Young Audiences Ensemble	
THEA 261	Acting II	

THEA 262	Introduction to Dance	
THEA 266	Voice and Movement for the Actor	
THEA 465	Directing II	
Related Area:		
ENGL 380	Shakespeare	3
Degree Requirements: Potential of 10 credits to reach 122		10
Total Credits		122

Department of Visual Arts

www.ndsu.edu/finearts/visual_arts

Art students develop creative technique as well as a life-long commitment to visual understanding and expression. Careers that may result from an art degree include commercial art/graphic design, animation, illustration, arts marketing, commercial photography, museum/gallery work, exhibition design, independent studio art, municipal art programs, art criticism, independent art instruction, art media research, arts organizations management, arts-funding agency work, or continued study in graduate school.

A comprehensive curriculum in visual arts is offered through a highly supportive studio program augmented by academic art courses. Emphasis is placed upon developing individual concept and content within a broad context of knowledge and skills. The faculty is composed of active studio artists and an art historian, all with extensive experience in both professional and academic settings. Well-equipped facilities are maintained for drawing, painting, printmaking, photography, digital media, sculpture and ceramics. Academic facilities both in the main library and in the James Falck Departmental Library house books, videos and publications.

All Art majors develop a strong foundation in design and drawing. Then, through experiences in diverse art media, they develop an area of concentration. Motivated and successful upper-class students are eligible to compete for scholarships and individual studio space. Art students are encouraged to supplement their education with outside art experiences such as summer internships and to participate in national and international art competitions and exhibitions.

Art (p. 250)

Art

Art Major

The Department of Visual Arts offers three undergraduate degrees: The Bachelor of Fine Arts, the Bachelor of Arts, and the Bachelor of Science. The B.F.A. is a professional degree featuring a studio art concentration, while the B.A. and B.S. are liberal arts degrees. Both the B.A. and B.S. require studio components.

Art (p. 251) (B.A./B.S.)

B.F.A. Art (p. 253)

Art Education (p. 254)

Minor Requirements

Art Minor

Minor Requirements

Required Credits: 18

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

Major Requirements

Major: Art

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences

Degree Requirements

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.

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 326	Writing in the Design Professions	
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ENGL 357	Visual Culture and Language	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A):

ART 210	Art History I	3
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ART 211	Art History II	3
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		40
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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:

Code	Title	Credits
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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
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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

General Education Requirements		40
AH&SS College Requirement		9
Major Requirements		
Studies in Art History:		
ART 210	Art History I	3
ART 211	Art History II	3
ART 452	Contemporary Art	3
Studies in Studio:		
ART 120	Painting I	3
ART 122	Two-Dimensional Design	3
ART 124	Three-Dimensional 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
or ART 185	Design and Digital Media I	
ART 230	Drawing II	3
ART 330	Drawing III	3
Intermediate Studio Course: Select one of the following:		3
ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	
ART 270	Printmaking II	
ART 280	Photography II	
ART 285	Design and Digital Media II	
Upper Division Studio Electives: Select one of the following:		3
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Photography III	
ART 385	Design and Digital Media III	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Photography IV	
ART 485	Design and Digital Media IV	
ART 494	Individual Study (IS may be used toward the upper division studio electives in the following areas: ceramics, digital media, drawing, painting, photography, printmaking or sculpture.)	
Baccalaureate Project: Capstone		

ART 489	Baccalaureate Project	3
Degree Requirements: Potential of 25 credits to reach 122		25
Total Credits		122

BFA Art

Major Requirements

Major: Art

Degree Type: B.F.A.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
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 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S): 10

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. Select from current general education list.

Humanities & Fine Arts (A):

ART 210	Art History I	3
ART 211	Art History II	3

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

Major Requirements

General Education Requirements 40

Bachelor of Fine Arts in Art Requirements

Studio Foundation (Level I Studio Classes):

ART 120	Painting I	3
ART 122	Two-Dimensional Design	3
ART 124	Three-Dimensional 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	Design and Digital Media I	3
Intermediate Studio Course: Select two of the following:		6
ART 220	Painting II	
ART 250	Ceramics II	
ART 270	Printmaking II	
ART 260	Sculpture II	
ART 280	Photography II	
ART 285	Design and Digital Media II	
Studies in Art History:		
ART 451	History of American Art	3
ART 452	Contemporary Art	3
ART 453	Topics in Art History	3
Studies in Studio		
Drawing:		
ART 230	Drawing II	3
ART 335	Figure Drawing	3
Baccalaureate Project: Capstone		
ART 489	Baccalaureate Project	3
ART 489	Baccalaureate Project	3
Studio Emphasis Electives: Select six of the following:		18
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Photography III	
ART 385	Design and Digital Media III	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Photography IV	
ART 485	Design and Digital Media IV	
ART 494	Individual Study (IS may be used in the studio emphasis electives and can be in the following areas: ceramics, digital media, drawing, painting, photography, printmaking or sculpture.)	
Degree Requirements: Potential of 10 credits to reach 122		10
Total Credits		122

Art Education

Major Requirements

Major: Art Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success	1
Communication (C):		

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
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 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A):		
ART 210	Art History I	3
ART 211	Art History II	3
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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	Two-Dimensional Design	3
ART 124	Three-Dimensional 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
or ART 185	Design and Digital Media I	
ART 230	Drawing II	3
ART 330	Drawing III	3
Art Studio or Art History Elective: Select 3 credits		3
Intermediate Studio Course: Select 3 credits from the following:		3
ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	
ART 270	Printmaking II	
ART 280	Photography II	
ART 285	Design and Digital Media II	
Upper Division Studio Electives: Select 3 credits from the following:		3
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Photography III	
ART 385	Design and Digital Media III	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Photography IV	
ART 485	Design and Digital Media IV	
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 credits		3
ART 489	Baccalaureate Project (Capstone)	
Degree Requirements: Potential of 10 credits to reach the minimum of 122		10
Total Credits		122

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.

Women and Gender Studies

The goals of Women and Gender Studies include: Examining the contributions of all genders to aspects of society; exploring the intersections of race, class, sexual orientation, age, and physical ability with gender both globally and nationally; investigating the heritage, challenges and concerns of women and men; and providing a newer and broader understanding of women and men in all fields.

A Women and Gender Studies program provides the benefits of a liberal arts education with an emphasis on critical thinking, writing, and organizational skills, making oral presentations, and expands the traditional acknowledgement that a liberal education produces well-rounded individuals. There also are multiple practical applications of a Women and Gender Studies major. The interdisciplinary curriculum, with an emphasis on equality and diversity, prepares students for leadership in the workplace, politics, health care, sport, family life, education, and law.

Women and Gender Studies Major

The major consists of 36 credits, including a 15 credit core, six hours of general Women and Gender Studies elective classes, and 15 hours of topic-intensive work (Women and Liberal Arts; Women, Families, and Health; and Women, Work, and Public Policy). Many of the courses in the topic-intensive electives are at Concordia College (<https://www.concordiacollege.edu/academics/departments-programs/womens-studies-2>) and Minnesota State University Moorhead (<https://www.mnstate.edu/women>).

Women and Gender Studies Minor

The Women and Gender Studies minor is an interdisciplinary program appropriate as a complement to various majors. This minor is particularly useful in acquiring perspectives that complement traditional studies for developing leadership roles or for pursuing careers that involve concerns about gender.

Major Requirements

Major: Women & Gender Studies

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences Degree Requirements

Bachelor of Science (B.S.) Degree - The completion of a minor program of study is required.

Bachelor of Arts (B.A.) Degree - Second year language proficiency required.

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		10
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. Select from current general education courses		
Humanities & Fine Arts (A):		
WGS 110	Introduction to Women's Studies	3
Select from current general education courses		3
Social & Behavioral Sciences (B):		
SOC 412	Sociology of Gender	3
Select from current general education courses		3
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
WGS 110	Introduction to Women's Studies	3
Global Perspectives (G): Select from current general education list		
Total Credits		40

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 for the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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, ENGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
General Education Requirements		40
AH&SS College Requirement		9
Women & Gender Studies Major		
WGS 350	Perspectives in Women's Studies	3
WGS 489	Internship/Capstone	3
SOC 424	Feminist Theory and Discourse	3
Electives: Select 6 credits from the following:		6
COMM 412	Gender and Communication	
ENGL 454	Language Bias	
HDFS 448	Issues In Sexuality	
SOC 219	Sociology of Sexual Behavior (MSUM)	
SOC 308	Social Gerontology (MSUM)	
SOC 310	Dominant-Subordinate Group Relations (MSUM)	
WGS 112	Introduction to Masculinities	
WGS 491	Seminar (10 hours = 1 credit)	
WGS 496	Field Experience	
WS 407	Inclusive Science: Women, Gender, and Science (MSUM)	
SOC 415	Media and Diverse Identities (MSUM)	
Topic Electives: Students must take classes in at least 3 topic areas.		15
Topic Area 1: Women, Work and Public Policy:		
COMM 383	Organizational Communication I	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS 353	Children, Families and Public Policy	
HDFS 468	Families and Work	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
SOC 235	Cultural Diversity	
SOC 410	Social Inequality	
SOC 439	Social Change	
Topic Area 2: Women and Liberal Arts:		
ANTH 303	Cross-Cultural Gender (MSUM)	
COMM 216	Intercultural Communication	
ENGL246	Women in Literature (MSUM)	

ENGL 248	Intro to American Ethnic Literature (MSUM)
ENGL 330	British and American Women Writers
ENGL 331	Contemporary Women Writers
ENGL 335	Multicultural Writers
ENG 365	Writing of Women (CC)
FREN 223	Race, Gender and Power in the Francophone World (CC)
FREN 345	Women in French Literature
HIST 259	Women in European History 1400-1800
HIST 344	Women and Development: The Asian Experience (CC)
SPAN 325	Hispanic Women Writers (CC)
THR 323	Women and Theatre (CC)
Topic Area 3: Women, Families and Health:	
COMM 380	Health Communication I
HDFS 230	Life Span Development
HDFS 242	Couples, Marriages and Families
HDFS 353	Children, Families and Public Policy
HDFS 462	Methods of Family Life Education
HDFS 475	Children and Families Across Cultures
PHRM 170	Common Medicines & Diseases
PSYC 210	Human Sexuality
PSYC 250	Developmental Psychology
SOC 416	Sociology Through Literature (M)
SOC 417	Sociology of the Family
SOC 439	Social Change
Degree Requirements: Potential of 43 credits to reach 122	
Total Credits	
43	
122	

Minor Requirements

Women & Gender Studies Minor

Minor Requirements

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
AHSS Courses - at least 3 credits from this area:		
COMM 412	Gender and Communication	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
HIST 259	Women in European History 1400-1800	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
SOC 235	Cultural Diversity	
SOC 412	Sociology of Gender	
SOC 417	Sociology of the Family	
SOC 424	Feminist Theory and Discourse	
SOC 439	Social Change	

HD&E Courses - at least 3 credits from this area

HDFS 230	Life Span Development
HDFS 242	Couples, Marriages and Families
HDFS 353	Children, Families and Public Policy
HDFS 448	Issues In Sexuality
HDFS 468	Families and Work
HDFS 475	Children and Families Across Cultures
Other Available Courses:	
PSYC 210	Human Sexuality
PSYC 250	Developmental Psychology
WGS 112	Introduction to Masculinities
WGS 491	Seminar

Total Credits**18****Minor Requirements and Notes**

- A minimum of 8 credits must be taken at NDSU

College of Business

Barry Hall 102, 701-231-8651, 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, and Marketing. Academic minors are offered in Accounting, Business Administration, Fraud Investigation, Logistics Management, and Management Information Systems. 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 for their freshman and sophomore years. Pre-major students apply for admission at least one semester prior to enrolling in the major program. To be considered for admission, students must submit an online application which can be found under "Student Resources (https://www.ndsu.edu/business/student_resources)" on the College of Business website.

Admission to the major programs (i.e., Accounting, Business Administration, Finance, Management, Management Information Systems, and Marketing) requires students to successfully complete, with a grade of 'C' or better, pre-college, and pre-major courses that are indicated with an asterisk (*) on the requirements page, achieve junior standing (60 credits), and earn a minimum 2.50 institutional cumulative grade point average (GPA).

The only exception to this policy is that students majoring in Accounting must earn a grade of 'B' or better in ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II.

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 courses into the professional program is limited to credit earned at business programs accredited by AACSB International. Contact the College of Business Student Service Center for more information.

Degree Programs

The College of Business offers undergraduate majors leading to a Bachelor of Science degree. The Master of Business Administration and Master of Accountancy degrees are described in the Graduate Bulletin (p. 573) online.

Degree Requirements

Students are required to complete the course requirements of one of the majors in the college. Students follow the published curricula for the major 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 program of study are subject to meeting the curricular requirements in effect at the time the new major is declared.

Students enter the College of Business as a pre-major student. Admission to the major program requires an application indicating the successful completion of the pre-major and college courses with a grade of "C" or higher, a 2.50 institutional grade point average, and a minimum of 60 credits.

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 courses included in the professional program (including all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives).

Students in the College of Business are responsible for monitoring their individual progress toward degree completion. Full time academic advisers and faculty advisers are available to provide guidance and answer questions.

Course Requirements

Students must have junior standing (60 credits) and a minimum cumulative grade point average of 2.5 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://www.ndsu.edu/career/internshipprogram>), 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 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 university or Tri-College University. Transfer courses with grades of 'D' are not accepted for ACCT 200, ACCT 201, other pre-college or pre-major requirements, and 300 and 400-level major requirements.
3. Students must have junior or senior standing and a minimum 2.50 institutional grade point average 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 five years. College of Business coursework taken before the five-year limit may be reviewed by the College of Business Student Progress Committee to determine its appropriateness to the major requirements.
6. Students majoring in the College of Business cannot minor in business administration.

Interdisciplinary Programs

The following program is interdisciplinary and is integrated with more than one college/departments within the University:

Logistics Management (p. 276)

Faculty

- Andersen, Margaret, Professor of Accounting, Ph.D., 1989, Indiana University
- Bahrami, Bahman, Professor of Management, Ph.D., 1983, University of Nebraska, Lincoln
- Banerjee, Somnath, Assistant Professor of Marketing, Ph.D., 2015, University of Central Florida
- Bitzan, John, Professor of Management, Ph.D., 1997, University of Wisconsin-Milwaukee
- Brown, Paul R., CPA, Senior Lecturer of Management, MBA, 1989, North Dakota State University
- Bowlin, William, Professor of Accounting, Ph.D., 1984, University of Texas at Austin
- Chen, Jun (Jeff), 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
- Dowdell, Thomas, Associate Professor of Accounting, 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., Professor of Management; Interim MBA Director, Ph.D., 1994, University of Minnesota
- Grothe, Cynthia, CPA, M.Acc. Program Advisor; Lecturer of Accounting, MBT, 2003, University of Southern California
- Hong, Yongtao, Associate Professor of Accounting, Ph.D., 2008, Drexel University
- Huseynov, Fariz, Associate Professor of Finance, Ph.D., 2009, University of Memphis
- Jones, Joseph M., Associate Professor of Marketing, Ph.D., 1994, University of Missouri-Columbia
- Klamm, Bonnie K., CPA, Professor of Accounting, Ph.D., 1999, Virginia Commonwealth University
- Knoepfle, Terry W., Emeritus Associate Professor of Business Law, JD, 1981, University of North Dakota
- Krishnakumar, Sukumarakurup "Kumar", Associate Professor of Management, Ph.D., 2008, Virginia Polytechnic Institute and State University
- Krush, Michael, Center for Professional Selling and Sales Technology Director; Associate Professor of Marketing, Ph.D., 2009, University of Nebraska-Lincoln
- Lehmborg, Derek, Assistant Professor of Management, Ph.D., 2010, University of Western Ontario
- Li, Jin, Associate Professor of Marketing, Ph.D., 2007, University of Alberta
- Macintosh, Gerrard, Professor of Marketing; Department Chair, Ph.D., 1992, University of Nebraska-Lincoln
- Marineau, Joshua, Assistant Professor of Management, Ph.D., 2012, University of Kentucky
- Pengnate, Supavich (Fone), Assistant Professor of Management Information Systems, Ph.D., 2013, Oklahoma State University, Stillwater, OK
- Petersen, Michael, CMA, CFM, Assistant Professor of Accounting, Ph.D., 2002, University of Iowa
- Peterson, Tim, Professor of Management; Ph.D., 1988, Texas A&M University
- Pillai, Rajani Ganesh, Assistant Professor of Marketing, Ph.D., 2008, University of Central Florida
- Riggins, Fred, Associate Professor of Management Information Systems, Ph.D., 1994, Carnegie Mellon University
- Schiebelhut, John H., Emeritus Professor of Business Administration, Ph.D., 1970, University of Oregon
- Smith, Andrea H., Lecturer of Business Law, JD, 1996, University of North Dakota School of Law
- Snyder, Herbert, CFE, Professor of Accounting; Department Chair, Ph.D., 1994, Syracuse University
- 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 Management, Ph.D., 2003, Case Western Reserve University
- Tangpong, Chanchai, Associate Professor of Management, Ph.D., 2002, Southern Illinois University, Carbondale
- Tian, Ruilin, Assistant Professor of Finance, Ph.D., 2008, Georgia State University
- Traub, Rodney D., Associate Professor of Management, Ph.D., 1994, Purdue University
- Wright, Newell D., Center for Global Initiatives Director; Professor of Marketing, Ph.D., 1993 Virginia Tech
- Young, Alex, Assistant Professor of Accounting, Ph.D., 2015, Duke University
- Zhang, Wei, Associate Professor of Finance, Ph.D., 2001, Syracuse University
- Zhang, Limin, Associate Professor of Management Information Systems, Ph.D., 2005, University of Arizona
- Zuber, Jill, CPA, Assistant Professor of Accounting, Ph.D., 2007, University of Arkansas

Department of Accounting, Finance, and Information Systems

www.ndsu.edu/business

The AFIS Department offers majors in Accounting, Finance, and Management Information Systems.

Practicum Requirement

Accounting and Management Information Systems majors are required to complete a three-credit practicum 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.

Graduate Program

The Master of Accountancy (M.Acc.) is available. See the Graduate Bulletin (p. 573) for more information.

Accounting (p. 263)

Finance (p. 267)

Fraud Investigation (p. 270)

Management Information Systems (p. 271)

Accounting

Accounting Major

Accounting is a profession that deals with providing financial information used in making business decisions. Accounting involves a range of skills that includes collecting, measuring, interpreting, analyzing, and communicating financial activity. A major in Accounting focuses on the development of such skills along with an understanding of the legal, social, and ethical responsibilities involved in the accounting profession.

Financial accountants prepare financial statements used in investing and lending decisions. Auditors examine financial statements and attest to their status. Management accountants evaluate and communicate internal financial information used by managers to operate a business. Forensic accountants specialize in the investigation and detection of, and protection against, fraud and abuse. Accountants also provide tax advisory services to firms, clients, and governmental agencies. With their specialized knowledge concerning the internal operation of a business, many accountants provide management advisory services. Also, because of the specialized knowledge, many accountants advance into management positions.

Students majoring in Accounting are required to learn how to apply technology in business and must take courses in many other aspects of business to understand how an accountant's work relates to marketing, management, finance, and production.

This four-year program leads to a Bachelor of Science degree with a major in Accounting. Completion of this program qualifies students to take the examinations required to become a Certified Management Accountant (CMA), Certified Internal Auditor (CIA), and Certified Fraud Examiner (CFE).

Students interested in sitting for the Certified Public Accounting (CPA) exam need an additional 28 credit hours beyond the 122 credit hours required for the Accounting major. Students are encouraged to satisfy the additional credit hours through the Master of Accountancy (M.Acc.) degree. Additional information about the M.Acc. program can be found in the Graduate Bulletin (p. 573) online.

Accounting Minor

Students earning majors in other fields may select a minor in Accounting. A minor includes ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, ACCT 311 Intermediate Accounting I, ACCT 320 Cost Management Systems, plus six credits in approved accounting courses. In addition, students must earn a 2.50 cumulative grade-point average in the accounting courses to be awarded a minor. A minor approval form is required and can be found at www.ndsu.edu/business. Completion of a minor in Accounting provides students with additional depth in accounting that many employers prefer.

Major Requirements

Major: Accounting

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking *	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics *	3
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Science & Technology (S):

CSCI 116	Business Use of Computers *	4
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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. Select from current general education list.

Humanities & Fine Arts (A):

PHIL 216	Business Ethics *	3
Select from current general education list		3

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics *	3
ECON 202	Principles of Macroeconomics *	3

Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G):	
ECON 201 Principles of Microeconomics *	3
or ECON 202 Principles of Macroeconomics	
Total Credits	40

Major Requirements

General Education Requirements	40
Pre-College of Business Requirements	
ACCT 200 Elements of Accounting I *	3
ACCT 201 Elements of Accounting II *	3
A minimum grade of B is required in ACCT 200 and ACCT 201 to enroll in 300 and 400 level accounting courses.	
MATH 103 College Algebra *	3
This is waived for students who place into MATH 105 or higher.	
PSYC 111 Introduction to Psychology *	3
or SOC 110 Introduction to Sociology	
STAT 331 Regression Analysis *	2
Pre-Accounting Requirements	
MATH 144 Mathematics for Business *	4
Accounting Major Requirements **	
BUSN 301 Organizational Citizen	0
FIN 320 Principles of Finance ¹	3
MGMT 320 Foundations of Management ¹	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	4
MIS 320 Management Information Systems ¹	3
ACCT 311 Intermediate Accounting I	4
ACCT 312 Intermediate Accounting II	4
ACCT 318 Taxation in Management Decisions	3
or ACCT 418 Tax Accounting I	
ACCT 320 Cost Management Systems	3
ACCT 420 Accounting Information Systems	3
ACCT 421 Auditing I	3
ACCT 300-400 Accounting Elective	3
300-400 Level Courses **	9
Any 300-400 level course in BUSN, FIN, MIS, MGMT, MRKT, or ECON 324; includes courses cross-listed with CoB courses; excludes LEAD prefix courses and BUSN 318. Courses numbered 394/494 require departmental approval.	
Accounting Practicum	
Students must complete one of the following options: ACCT 397 Cooperative Education Program; UNIV 492 Study Abroad Program; ACCT 413 Accounting Internship; IME 456 Program and Project Management; or AGECE 371 Export Management.	3
Degree Electives: Potential of 10 credits to reach 122.	10
Total Credits	122

* Pre-college and pre-accounting major courses. A grade of 'C' or better for pre-college and pre-accounting major courses is required for admission into the Accounting major. The only exception is ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, which require grades of 'B' or better.

** Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives). The only exception is BUSN 301, which is a P/F course.

¹ 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 into the Accounting Major: Students must earn a 'B' or better in ACCT 200 Elements of Accounting I and ACCT 201 Elements of Accounting II, a 'C' or better in the pre-college and pre-accounting major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- 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 300-400 level accounting, business administration, finance, management, management information systems, and marketing courses.
- A 2.50 cumulative GPA is required to enroll in 300-400 level CoB courses.
- A letter grade must be earned in any course that fulfills a major requirement (with the exception of some practicum options and BUSN 301).
- 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor Requirements

Accounting Minor

Minor Requirements

Required Credits: 19

Students should refer to the College of Business (<https://www.ndsu.edu/business>) for information on declaring the minor.

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
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 and at least junior standing (60 credits).
- 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.

Freshman

Fall	Credits Spring	Credits
BUSN 189 ¹	1 COMM 110	3

ENGL 110	3	ENGL 120	3
MATH 103	3	MATH 144	4
PSYC 111 or SOC 110	3	Science/Technology Elective (w/lab)	4
Humanities/Fine Arts Elective	3	Non-major Elective	2-3
Wellness	2		
	15		16-17

Sophomore

Fall	Credits	Spring	Credits
ACCT 200	3	ACCT 201	3
CSCI 116	4	ECON 202	3
ECON 201	3	PHIL 216	3
STAT 330	3	STAT 331	2
Cultural Diversity or Non-Major Elective	3	Cultural Diversity or Non-major Elective	3
		Science/Technology Elective	2
	16		16

Junior

Fall	Credits	Spring	Credits	Summer	Credits
ACCT 311	4	ACCT 312	4	ACCT 397 ²	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	4
ACCT 421	3	300-400 Level Business Electives (2)	6
FIN 320	3	300-400 Level Accounting Elective	3
300-400 Level Business Elective	3		
Non-major Elective	2-4		
	14-16		13

Total Credits: 122-125

¹ At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301 (0 credits).

² Complete one of the following options: ACCT 413 Internship, ACCT 397 Cooperative Education Program, UNIV 492 Study Abroad Program, IME 456 Program/Project Management, BUSN 486 Senior Thesis, or AGECE 371 Export Management. Requires faculty adviser'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 adviser on a regular basis to review their plan of study.

Finance

Finance Major

The Finance major provides an academic experience sufficient to prepare students for employment in financial services, which includes banking, investment banking, investment management, financial planning, insurance and financial management. It also benefits students interested in pursuing finance-related professional certifications such as the Certified Financial Planner (CFP) and Chartered Financial Analyst (CFA).

Major Requirements

Major: Finance

Degree Type: B.S.

Required Degree Credits to Graduate: 123

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking *	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics *	3
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Science & Technology (S):

CSCI 116	Business Use of Computers *	4
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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. Select from current general education list. 6

Humanities & Fine Arts (A):

PHIL 216	Business Ethics *	3
Select from current general education list		3

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics *	3
ECON 202	Principles of Macroeconomics *	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 201 or ECON 202	Principles of Microeconomics * Principles of Macroeconomics	3
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Total Credits 40

Major Requirements

General Education Requirements 40

Pre-College of Business Requirements

ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
MATH 103	College Algebra *	3
This is waived for students who place into MATH 105 or higher.		
PSYC 111 or SOC 110	Introduction to Psychology * Introduction to Sociology	3
STAT 331	Regression Analysis *	2

Pre-Finance Requirements

MATH 144	Mathematics for Business *	4
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Finance Major Requirements **

BUSN 301	Organizational Citizen	0
FIN 320	Principles of Finance ¹	3
MGMT 320	Foundations of Management ¹	3
MRKT 320	Foundations of Marketing ¹	3
BUSN 430	Legal and Social Environment of Business ¹	3
FIN 410	Investment Analysis and Management	3
FIN 430	Management of Financial Institutions	3
FIN 460	Corporate Finance	3
BUSN 489	Strategic Management (Capstone Course) ¹	4
MIS 320	Management Information Systems ¹	3
Finance Courses **		
FIN 420	Options, Futures, and Other Derivatives	3
FIN 440	International Finance	3
FIN 470	Analysis of Fixed-Income Securities	3
300-400 level Courses **		18
Select 9 credits from three of the following six areas (includes courses cross-listed with CoB courses):		
1) ACCT		
2) MGMT		
3) MRKT		
4) MIS		
5) Environment of Business:		
BUSN 318	Taxation in Management Decisions	
BUSN 340	International Business	
BUSN 341	Global Business Environment	
BUSN 347	Principles of Real Estate	
BUSN 383	Organizational Communication I	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	
BUSN 440	International Business Law	
BUSN 474	Cooperatives	
BUSN 487	Managerial Economics	
6) Internship up to three credits:		
FIN 397	Fe/Coop Ed/Internship	
FIN 413	Finance Service Internship	
Select 9 credits (minimum) from the following eleven areas (must be 300-400 level); includes courses cross-listed with CoB courses:		
1) FIN		
2) ACCT		
3) AGECE		
4) BUSN		
5) CSCI		
6) ECON		
7) MATH		
8) MGMT		
9) MIS		
10) MRKT		
11) STAT		
Degree Electives: Potential of 10 credits to reach 123.		10
Total Credits		123

* Pre-college and pre-finance major courses: A grade of 'C' or better is required in these courses for admission to the Finance major.

** Students must earn a grade of 'C' or better and have a minimum 2.5 cumulative GPA in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level College of Business electives or breadth electives). The only exception is BUSN 301, which is a P/F course.

¹ Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- 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 earn a 'C' or better in the pre-college and pre-finance major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. 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 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 and BUSN 301).
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- 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 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Freshman			
Fall	Credits	Spring	Credits
BUSN 189*	1	COMM 110	3
CSCI 116	4	ENGL 120	3
ENGL 110	3	MATH 144	4
MATH 103	3	PSYC 111 or SOC 110	3
Humanities/Fine Arts Elective	3	Cultural Diversity or Non-major Elective	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	3-4
Science & Technology Elective	2	Science & Technology Elective (w/ lab)	4
Wellness	2		
	16		15-16

Junior			
Fall	Credits	Spring	Credits
ENGL 320	3	BUSN 430	3
FIN 320	3	300-400 Level Business Elective	3
MGMT 320	3	300-400 Level Business Elective	3
MIS 320	3	FIN 430	3
MRKT 320	3	FIN 460	3
			15
Senior			
Fall	Credits	Spring	Credits
FIN 410	3	BUSN 489	4
FIN 420	3	FIN 440	3
300-400 Level Business Elective	3	FIN 470	3
300-400 Level Business Elective	3	300-400 Level Business Elective	3
Non-Major Elective(s)	4	300-400 Level Business Elective	3
			16

Total Credits: 123-124

* At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301 (0 credits).

Note: This is only a sample curriculum; actual class schedules will depend on availability and individual choices. Students are encouraged to meet with their academic adviser on a regular basis to review their plan of study.

Fraud Investigation

Fraud Investigation

The Department of Accounting, Finance, and Information Systems, in collaboration with the Department of Criminal Justice and Political Science, 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, Finance, and Information Systems (https://www.ndsu.edu/acct_fin_mis) or the Department of Criminal Justice and Political Science (<https://www.ndsu.edu/cjps>) for further information on requirements.

Minor Requirements

Fraud Investigation Minor

Minor Requirements

Required Credits: 20-21

This minor requires a grade of 'C' or better and a GPA of 2.50 in all courses that make up this minor. The only exception is ACCT 200 and ACCT 201, which require grades of 'B' or better to enroll in 300-400 level accounting courses.

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
ACCT 410	Fraud Examination *	3
ACCT 411	Advanced Fraud Examination **	3
Criminal Justice Courses		
CJ 201	Introduction to Criminal Justice	3

CJ 230	Criminology and Criminal Law	3
Criminal Justice or Political Science Course		
CJ 330	Criminal Law and Procedure	2-3
or POLS 431	Constitutional Law-Criminal Justice	
Total Credits		20-21

* ACCT 421 Auditing I: may substitute for this course if the student has taken ACCT 610 Fraud Examination and ACCT 611 Advanced Fraud Examination

** 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 (<https://www.ndsu.edu/business/majorsminorslist/minors>) with the College of Business. Acceptance into this minor program requires students to have a minimum institutional cumulative GPA of 2.50 and at least junior standing (60 credits). To complete a minor, students must earn at least a 2.50 GPA in courses used to satisfy 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 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.

Management Information Systems

Management Information Systems Major

Management Information Systems concerns the collection, organization, analysis, and dissemination of information for the planning and control of business/organizational operations. The Management Information Systems (MIS) program is designed for students who wish to prepare for professional careers in information processing or information systems in business and government. The program is designed to develop technical skills and administrative insights required for design, development, implementation, maintenance, and management of organizational information systems.

The MIS program at NDSU is a collaborative effort by the faculty of two disciplines: Management Information Systems and Computer Science. The objective is to provide students with both theoretical knowledge and hands-on experience. In addition to the required courses in management information systems and computer science, majors must complete a practicum in the management information systems area. Students pursuing an MIS major typically earn a Computer Science minor.

The Bachelor of Science (B.S.) degree provides sufficient background and skills to support a successful career in technical computing (for example, programmer, systems analyst, or systems designer), systems or network administration, database administration, information technology management, sales, or technical sales support.

Management Information Systems Minor

The Management Information Systems minor is intended for students who are planning careers that involve more active roles as computer users and evaluators, designers, and/or builders of information systems. The minor will provide exposure to issues relevant to the management of information technologies and the means to achieve organizational goals.

Contact the Department of Accounting, Finance, and Information Systems for specific course and minimum grade point average requirements. A minor approval form is required and can be found on the College of Business (<https://www.ndsu.edu/business>) website.

Major Requirements

Major: Management Information Systems

Degree Type: B.S.

Required Degree Credits to Graduate: 127

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking *	3

Quantitative Reasoning (R):		
STAT 330	Introductory Statistics *	3
Science & Technology (S):		
CSCI 116	Business Use of Computers *	4
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. Select from current general education list.		
Humanities & Fine Arts (A):		
PHIL 216	Business Ethics *	3
Select from current general education list		
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics *	3
ECON 202	Principles of Macroeconomics *	3
Wellness (W): Select from current general education list		
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201 or ECON 202	Principles of Microeconomics * Principles of Macroeconomics	3
Total Credits		40

Major Requirements

General Education Requirements			40
Pre-College of Business Requirements			
ACCT 200	Elements of Accounting I *	3	
ACCT 201	Elements of Accounting II *	3	
MATH 103	College Algebra (This is waived for students who place into MATH 105 or higher.) *	3	
PSYC 111 or SOC 110	Introduction to Psychology * Introduction to Sociology	3	
STAT 331	Regression Analysis *	2	
Pre-MIS Requirements			
CSCI 227	Computing Fundamentals I (Fall) *	3	
CSCI 228	Computing Fundamentals II (Spring) *	3	
MATH 144	Mathematics for Business *	4	
Management Information Systems Major Requirements **			
BUSN 301	Organizational Citizen	0	
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	4	
CSCI 316	System Testing and Maintenance (May change to MIS 350 in the future.)	3	
MIS 320	Management Information Systems ¹	3	
MIS 315	System Analysis and Design	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	
CSCI 489	Social Implications of Computers (F)	3	
Management Information Systems Practicum			
Select one of the following:			3
MIS 397	Fe/Coop Ed/Internship		
UNIV 492	Study Abroad		

MIS 413	MIS Service Internship	
IME 456	Program and Project Management	
CSCI 445	Software Projects Capstone	
AGEC 371	Export Management	
Elective Requirements for MIS Major. Complete 3 credits in each of the four areas below: **		
1) Programming Language Course (Select one of the following):		3
CSCI 125	Beginning COBOL	
CSCI 213	Modern Software Development	
ECE 173	Introduction to Computing	
Or complete an intermediate or advanced CSCI course that was not the teaching language of CSCI 227/CSCI 228		
2) Technology Elective I: Select one course from the following:		3
CSCI 125	Beginning COBOL	
CSCI 172	Intermediate Visual BASIC	
CSCI 222	Discrete Mathematics	
CSCI 277	Introduction to UNIX	
or MIS 277	Introduction to UNIX	
CSCI 299	Special Topics	
or MIS 299	Special Topics	
CSCI 336	Theoretical Computer Science II	
ECE 173	Introduction to Computing	
ECE 275	Digital Design	
Any 300-400 level CSCI or MIS course not used to satisfy another MIS major requirement		
3) Technology Elective II:		3
Any 300-400 level CSCI or MIS course not used to satisfy another MIS major requirement		
4) Business Elective:		3
Any 300-400 level CoB course not used to satisfy other requirements, or CSCI 473, or ECON 324; includes courses cross-listed with CoB courses; excludes internships, study abroad, LEAD courses & MIS 371		
Degree Electives: Potential of 5 credits to reach 127.		5
Total Credits		127

* 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.

** Students must earn a 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives). The only exception is BUSN 301, which is a P/F course.

¹ Denotes Common Body of Knowledge (CBK) course.

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 into the MIS Major: Students must earn a 'C' or better in the pre-college and pre-MIS courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- 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 and BUSN 301).
- Requirements for graduation are those in existence at the time of admission to the MIS major.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- 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 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor Requirements

Management Information Systems Minor

Minor Requirements

Required Credits: 21

Students should refer to www.ndsu.edu/business for information on declaring the minor with the CoB.

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 and at least junior standing (60 credits). 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.

Freshman		
Fall	Credits Spring	Credits
BUSN 189 ¹	1 COMM 110	3
CSCI 116	4 ENGL 120	3
ENGL 110	3 PSYC 111 or SOC 110	3
MATH 103	3 MATH 144	4
Cultural Diversity Elective	3 Humanities/Fine Arts Elective	3
Non-major Elective	2-3	
	16-17	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
Science & Technology Elective (w/lab)	4 STAT 331	2
	Wellness	2
	16	16

Junior				
Fall	Credits Spring	Credits Summer	Credits	
MGMT 320	3 BUSN 430	3 MIS 397	3	
MRKT 320	3 ENGL 320	3		
MIS 320	3 FIN 320	3		
MIS 315	3 CSCI 316	3		
Programming Language Elective	3 MIS 375	3		
	15	15	3	

Senior		
Fall	Credits Spring	Credits
CSCI 312	3 BUSN 489	4
CSCI 489	3 MGMT 360	3
MIS 376	3 MIS 470	3
Technology Elective I	3 Science & Technology Elective	2
300-400 Level Business Elective	3 Technology Elective II	3
	15	15

Total Credits: 127-128

¹ At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301.

² Students must complete one of the following options: MIS 397 Cooperative Education, UNIV 492 Study Abroad, MIS 413 Service Internship, IME 456 Program/Project Management, BUSN 486 Senior Thesis, CSCI 445 Capstone: Software Projects, or AGECE 371 Export Management. Requires faculty adviser'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 adviser on a regular basis to review their plan of study.

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.

Minor Requirements

Logistics Management Minor

Minor Requirements

Required Credits: 19

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Courses		
MGMT 320	Foundations of Management	3
MGMT 461	Supply Chain Management	3
BUSN 491	Seminar	1
AGEC 378	Introduction to Transportation & Logistics	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	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 be accepted into this minor program, students must have a cumulative institutional GPA of 2.50 and at least junior standing (60 credits).
- 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.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for College of Business courses until the cumulative GPA returns to 2.50 or above.
- Approval for a minor does not guarantee enrollment in specific courses.
- This minor must be officially declared (<https://www.ndsu.edu/business/majorsminorslist/minors>); see the College of Business for information.
- A minimum of 8 credits must be taken at NDSU.

Department of Management and Marketing

www.ndsu.edu/business

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 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.

Graduate Program

The Master of Business Administration (MBA) is available. See the Graduate Bulletin (p. 573) for further information.

Business Administration (p. 277)

Global Business (p. 281)

Management (p. 283)

Marketing (p. 286)

Logistics Management (p. 282)

Professional Selling (p. 290)

Business Administration

Business Administration Major

The Business Administration major is designed to provide students with a broad background in all of the aspects of business. Business Administration might be an appropriate major for students who will work in smaller organizations or own their businesses which will require a broader understanding of business. Also, some organizations may seek generalists rather than specialists because they may be more adaptable in rapidly changing business environments. This major might also be appropriate for students intending to go on to graduate studies that would benefit from a broad understanding of business, e.g., law school.

Business Administration Minor

Majors outside the College of Business often select a minor in Business Administration. A minor in Business Administration requires a minimum of 24 credits. At least 12 credits in 300-400 level BUSN, FIN, MGMT, and MRKT courses must be completed at NDSU in the College of Business. Prior departmental approval is required for any 300-400 level course not completed at NDSU but used to satisfy the minor requirements.

Students must earn a 2.50 grade point average that is based on the courses used for the Business Administration minor. A minor approval form is required and can be found at www.ndsu.edu/business. This minor is not available to students with majors in the College of Business.

Major Requirements

Major: Business Administration

Degree Type: B.S.

Required Degree Credits to Graduate: 126

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
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ENGL 120	College Composition II *	3
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ENGL 320	Business and Professional Writing	3
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COMM 110	Fundamentals of Public Speaking *	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics *	3
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Science & Technology (S):

CSCI 116	Business Use of Computers *	4
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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. Select from current general education list		6
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Humanities & Fine Arts (A):

PHIL 216	Business Ethics *	3
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Select from current general education list		3
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Social & Behavioral Sciences (B):			
ECON 201	Principles of Microeconomics *		3
ECON 202	Principles of Macroeconomics *		3
Wellness (W): Select from current general education list			2
Cultural Diversity (D): Select from current general education list			
Global Perspectives (G):			
ECON 201	Principles of Microeconomics *		3
or ECON 202	Principles of Macroeconomics		
Total Credits			40

Major Requirements

General Education Requirements			40
Pre-College of Business Requirements			
ACCT 200	Elements of Accounting I *		3
ACCT 201	Elements of Accounting II *		3
MATH 103	College Algebra *		3
This is waived for students who place into MATH 105 or higher.			
STAT 331	Regression Analysis *		2
Pre-Business Administration Requirements			
MATH 144	Mathematics for Business *		4
PSYC 111	Introduction to Psychology *		3
SOC 110	Introduction to Sociology *		3
Business Administration Major Requirements **			
BUSN 301	Organizational Citizen		0
FIN 320	Principles of Finance ¹		3
MGMT 320	Foundations of Management ¹		3
MGMT 330	Foundations of Organizational Behavior		3
MGMT 360	Operations Management		3
MRKT 320	Foundations of Marketing ¹		3
BUSN 430	Legal and Social Environment of Business ¹		3
BUSN 487	Managerial Economics		4
BUSN 489	Strategic Management ¹		4
MIS 320	Management Information Systems ¹		3
ECON 324	Money and Banking		3
300-400 Level Courses **			18

Of the 18 credits, at least one 300-400 level course must be completed in each of the following 4 areas (includes courses cross-listed with CoB courses):

1) FIN	
2) MGMT	
3) MRKT	
4) Environment of Business: Select at least one from the following:	
BUSN 318	Taxation in Management Decisions
BUSN 340	International Business
BUSN 341	Global Business Environment
BUSN 347	Principles of Real Estate
BUSN 383	Organizational Communication I
BUSN 431	Business Law I-Contracts, Property and Torts
BUSN 432	Business Law II-Business Organization and Commercial Transactions
BUSN 440	International Business Law
BUSN 474	Cooperatives

300-400 College of Business Electives **

Any courses from the College of Business with the prefixes of ACCT, BUSN, FIN, LEAD, MGMT, MIS, or MRKT; includes courses cross-listed with CoB courses; excludes ATHL credits

Degree Electives: Potential of 9 credits to reach 126. 9

Total Credits **126**

- * Pre-college and pre-business administration major courses. A grade of 'C' or better for pre-college and pre-business administration major courses is required for admission into the Business Administration major.
- ** Students must earn a 'C' or better and have a minimum 2.5 cumulative GPA in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives). The only exception is BUSN 301, which is a P/F course.
- ¹ Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Students follow the published curricula for the business administration 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 Business Administration Major: Students must earn a 'C' or better in the pre-college and pre-business administration major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- 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 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. The only exception is BUSN 301, which is a P/F course.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- 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 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Minor Requirements

Business Administration Minor

Minor Requirements

Required Credits: 24

Students should refer to College of Business (<https://www.ndsu.edu/business>) for information on declaring this minor.

Requirements

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

Select one of the following: 3-6

ECON 105	Elements of Economics
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ECON 201 & ECON 202	Principles of Microeconomics and 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		12
An additional 12 credits of 300-400 level business administration (BUSN), Finance (FIN), Management (MGMT), or Marketing (MRKT) courses; may include MIS 320, ENTR 366, ENTR 385, LEAD 305, LEAD 325, but excludes BUSN 413 and BUSN 415; may also include courses cross-listed with CoB courses		
Total Credits		24

Minor Requirements and Notes

- To be accepted into the minor program, students must have a 2.50 institutional cumulative GPA and at least junior standing (60 credits). This minor is not available to students with majors in the College of Business.
- 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.
- Students should refer to www.ndsu.edu/business for information on declaring the minor with the College of Business.

Freshman		
Fall	Credits Spring	Credits
BUSN 189*	1 COMM 110	3
SOC 110	3 ENGL 120	3
CSCI 116	4 MATH 103	3
ENGL 110	3 PSYC 111	3
Humanities/Fine Arts Elective	3 Wellness Elective	2
Non-major Elective	3 Science & Technology Elective	2
	17	16
Sophomore		
Fall	Credits Spring	Credits
ACCT 200	3 ACCT 201	3
ECON 201	3 ECON 202	3
MATH 144	4 STAT 331	2
PHIL 216	3 Cultural Diversity or Non-Major Elective	3
STAT 330	3 Science & Technology Elective (w/ lab)	4
	16	15
Junior		
Fall	Credits Spring	Credits
ENGL 320	3 BUSN 430	3
FIN 320	3 MGMT 330	3
MGMT 320	3 MIS 320	3
MRKT 320	3 300-400 Level Business Electives (2)	6
Non-major Elective	3-4	
	15-16	15

Senior			
Fall	Credits	Spring	Credits
BUSN 487	4	BUSN 489	4
ECON 324	3	300-400 Level Business Electives (4)	12
MGMT 360	3		
300-400 Level Business Electives	6		
	16		16

Total Credits: 126-127

* At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301 (0 credits).

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 adviser on a regular basis to review their plan of study.

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 an in-depth study abroad experience to qualify students for management positions in the diverse, multicultural, and global environment they will encounter in the future. It is not enough to simply learn about global business: students must be well-positioned for careers of trust and leadership in the global economy.

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 (p. 260) for *all* College of Business majors).

II. Core Requirement

I. Core Requirement

Group A			
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 an equivalent study abroad course) *		3
BUSN 489	Strategic Management		4
Group B: Complete 3 of the following:			9
MRKT 372	Global Retailing		
MGMT 440	International Management		
FIN 440	International Finance		
MRKT 440	International Marketing		
BUSN 440	International Business Law		
AGEC 371	Export Management		
II. Language Requirement **			3-14
III. Study Abroad Requirement ***			3
Total Credits			40-51

- * 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 (business environment, institutions, history, and cultures of the European Union) BUSN 394: Individual Study (business environment, institutions, history, and culture of China) may also fulfill this requirement. 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. While these courses will fulfill the academic requirement portion of the study abroad experience, the student must study abroad for at least three weeks as described in study abroad footnote***.
- ** 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
- *** Each student must complete an approved study abroad experience (Prefix 492). Although the core requirement of BUSN 341 or equivalent already encompasses a study abroad experience, students earning a second major in global business must study abroad for at least three weeks. In some cases, the study abroad requirement is fulfilled by one study abroad experience - e.g., a five week program in Europe or a full semester abroad. However, two shorter programs may be substituted for a longer program (e.g., the ten-day CoB spring break experience in Eastern Europe and the twelve-day CoB summer trip to China).

notes

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 core requirement group A.

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.

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.

Minor Requirements

Logistics Management Minor

Minor Requirements

Required Credits: 19

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Courses		
MGMT 320	Foundations of Management	3
MGMT 461	Supply Chain Management	3
BUSN 491	Seminar	1
AGEC 378	Introduction to Transportation & Logistics	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	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 be accepted into this minor program, students must have a cumulative institutional GPA of 2.50 and at least junior standing (60 credits).
- 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.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for College of Business courses until the cumulative GPA returns to 2.50 or above.
- Approval for a minor does not guarantee enrollment in specific courses.
- This minor must be officially declared (<https://www.ndsu.edu/business/majorsminorslist/minors>); see the College of Business for information.
- A minimum of 8 credits must be taken at NDSU.

Management

Management Major

The Management major is designed to provide students with the analytical and conceptual background necessary for effective management of businesses and other organizations. Students develop expertise in the major sub-areas of organizational behavior, production and operations management, human resources, and strategy. Students with management majors find employment in all types of profit and non-profit organizations. Students pursuing a Management major may also choose the Human Resource Management track.

Human Resource Management Track

The Human Resource Management track provides students with the knowledge and skills necessary to effectively serve in a Human Resource Management position. Students obtain knowledge in the legal environment of employment, job analysis, recruitment and selection, performance appraisals, compensation, training and labor relations.

Major Requirements

Major: Management

Degree Type: B.S.

Required Degree Credits to Graduate: 126

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking *	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics *	3
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Science & Technology (S):

CSCI 116	Business Use of Computers *	4
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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. Select from current general education list

Humanities & Fine Arts (A):

PHIL 216	Business Ethics *	3
Select from current general education list		3

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics *	3
ECON 202	Principles of Macroeconomics *	3

Wellness (W): Select from current general education list

2

Cultural Diversity (D): Select from current general education list**Global Perspectives (G):**

ECON 201	Principles of Microeconomics *	3
or ECON 202	Principles of Macroeconomics	

Total Credits **40**

Major Requirements

General Education Requirements **40**

Pre-College of Business Requirements

ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
MATH 103	College Algebra (This is waived for students who place into MATH 105 or higher.) *	3
STAT 331	Regression Analysis *	2

Pre-Management Requirements

MATH 144	Mathematics for Business *	4
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3

Management Major Requirements **

BUSN 301	Organizational Citizen	0
FIN 320	Principles of Finance ¹	3
MGMT 320	Foundations of Management ¹	3
MGMT 330	Foundations of Organizational Behavior	3
MGMT 360	Operations Management	3
MRKT 320	Foundations of Marketing ¹	3
BUSN 430	Legal and Social Environment of Business ¹	3
MGMT 450	Human Resource Management	3
BUSN 489	Strategic Management (Capstone Course) ¹	4
MIS 320	Management Information Systems ¹	3

300-400 Level Management Courses ** **12**

Select courses from current MGMT curriculum

300-400 Level Courses ** **9**

Select courses from 3 of the following areas (includes courses cross-listed with CoB courses):

1) ACCT

2) FIN

3) MRKT

4) MIS

5) Environment of Business:

BUSN 318 Taxation in Management Decisions

BUSN 340 International Business

BUSN 341 Global Business Environment

BUSN 347 Principles of Real Estate

BUSN 383 Organizational Communication I

BUSN 431 Business Law I-Contracts, Property and Torts

BUSN 432 Business Law II-Business Organization and Commercial Transactions

BUSN 440 International Business Law

BUSN 474 Cooperatives

Additional 300-400 Level Courses ** **6**

These additional 300-400 level electives cannot be used to satisfy other requirements; includes courses cross-listed with CoB courses; excludes ATHL credits

Degree Electives: Potential of 10 credits to reach 126 **10**

Total Credits **126**

- * Pre-college and pre-management major courses. A grade of 'C' or better for pre-college and pre-management major courses is required for admission into the Management Major.
- ** Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives). The only exception is BUSN 301, which is a P/F course.
- ¹ Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Students follow the published curricula for the management 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 Management major: Students must earn a 'C' or better in the pre-college and pre-management major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- Admission to the Management 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 BUSN 301, which is a P/F course.
- Student may choose to take the Human Resource Management Track within the Management major:

MGMT 452	Compensation Management (Required)	3
Select two of the following:		
MGMT 454	Labor-Management Relations	3
MGMT 451	Negotiation and Alternative Dispute Resolution	3
MGMT 453	Understanding and Managing Diversity in Organizations	3

- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- 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 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

NOTE: This

Freshman		
Fall	Credits Spring	Credits
BUSN 189 [*]	1 COMM 110	3
CSCI 116	4 ENGL 120	3

ENGL 110	3	MATH 144	4
MATH 103	3	SOC 110	3
PSYC 111	3	Humanities/Fine Arts Elective	3
Cultural Diversity or Non-Major Elective	3		
	17		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	Cultural Diversity or Non-major elective	3
Science & Technology Elective	2	Science & Technology Elective (w/ lab)	4
Wellness Elective	2		
	16		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
Non-major Electives	4	300-400 Level Business Elective	3
	16		15

Senior

Fall	Credits	Spring	Credits
MGMT 360	3	BUSN 489	4
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
300-400 Level Electives	3	300-400 Level Elective	3
	15		16

Total Credits: 126

* At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301 (0 credits).

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 adviser on a regular basis to review their plan of study.

Marketing

Marketing Major

The Marketing major is designed for students pursuing careers in one of the subfields of marketing, such as product management, retailing, marketing communication, sales and sales management, distribution, or marketing research. These positions may be as technical specialists or as general marketing managers.

Major Requirements

Major: Marketing

Degree Type: B.S.

Required Degree Credits to Graduate: 126

General Education Requirements

First Year Experience (F):

BUSN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take BUSN 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking *	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics *	3
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Science & Technology (S):

CSCI 116	Business Use of Computers *	4
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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. Select from current general education list

Humanities & Fine Arts (A):

PHIL 216	Business Ethics *	3
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Select from current general education list

Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics *	3
ECON 202	Principles of Macroeconomics *	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 201	Principles of Microeconomics *	3
or ECON 202	Principles of Macroeconomics	

Total Credits 40

Major Requirements

General Education Requirements 40

Pre-College of Business Requirements

ACCT 200	Elements of Accounting I *	3
ACCT 201	Elements of Accounting II *	3
MATH 103	College Algebra *	3

This is waived for students who place into MATH 105 or higher.

STAT 331	Regression Analysis *	2
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Pre-Marketing Requirements

MATH 144	Mathematics for Business *	4
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3

Marketing Major Requirements**

BUSN 301	Organizational Citizen	0
FIN 320	Principles of Finance ¹	3
MGMT 320	Foundations of Management ¹	3
MRKT 320	Foundations of Marketing ¹	3
BUSN 430	Legal and Social Environment of Business ¹	3
MRKT 410	Consumer Behavior	3
MRKT 450	Marketing Research	3

MRKT 460	Marketing Strategy	3
BUSN 489	Strategic Management (Capstone Course) ¹	4
MIS 320	Management Information Systems ¹	3
300-400 Level Marketing Courses **		12
Select courses from current MRKT curriculum		
300-400 level Courses **		9
Select courses from 3 of the following areas (includes courses cross-listed with CoB courses):		
1) ACCT		
2) FIN		
3) MGMT		
4) MIS		
5) Environment of Business:		
BUSN 318	Taxation in Management Decisions	
BUSN 340	International Business	
BUSN 341	Global Business Environment	
BUSN 347	Principles of Real Estate	
BUSN 383	Organizational Communication I	
BUSN 431	Business Law I-Contracts, Property and Torts	
BUSN 432	Business Law II-Business Organization and Commercial Transactions	
BUSN 433		
BUSN 440	International Business Law	
BUSN 474	Cooperatives	
Additional 300-400 Level Courses **		6
These additional 300-400 level electives cannot be used to satisfy other requirements; includes courses cross-listed with CoB courses; excludes ATHL credits		
Degree Electives: Potential of 10 credits to reach 126		10
Total Credits		126

- * Pre-college and pre-marketing major courses. A grade of 'C' or better for pre-college and pre-marketing major courses is required for admission into the Marketing major.
- ** Students must earn a grade of 'C' or better, and have a minimum 2.5 cumulative GPA, in ALL courses included in the professional program (i.e., all required courses, elective requirements, and additional 300-400 level CoB electives or breadth electives). The only exception is BUSN 301, which is a P/F course.
- ¹ Denotes Common Body of Knowledge (CBK) course.

Degree Requirements and Notes

- Students must include one of the following international courses in their plan of study:

BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
FIN 440	International Finance	3
MGMT 440	International Management	3
MRKT 440	International Marketing	3

- Students follow the published curricula for the marketing 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 Marketing Major: Students must earn a 'C' or better in the pre-college and pre-marketing major courses that are indicated with an asterisk (*), achieve junior standing (60 credits), and earn a 2.50 institutional cumulative grade point average. Students must submit an online application to the CoB.
- 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 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 BUSN 301, which is a P/F course.
- Requirements for graduation are those in existence at the time of admission to the marketing major.
- A 2.50 cumulative grade point average is required to enroll in 300-400 level CoB courses.
- 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.
- Students should refer to www.ndsu.edu/business for current and complete listing of the major requirements.

Freshman			
Fall	Credits	Spring	Credits
BUSN 189 [†]	1	COMM 110	3
CSCI 116	4	ENGL 120	3
ENGL 110	3	MATH 144	4
MATH 103	3	SOC 110	3
PSYC 111	3	Cultural Diversity or Non-major Elective	3
Humanities/Fine Arts Elective	3		
	17		16
Sophomore			
Fall	Credits	Spring	Credits
ACCT 200	3	ACCT 201	3
ECON 201	3	COMM 110	3
PHIL 216	3	ECON 202	3
STAT 330	3	STAT 331	2
Science & Technology Elective	2	Non-major Electives	4
Wellness	2		
	16		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
Non-major Electives	4	300-400 Level Business Elective	3
	16		15
Senior			
Fall	Credits	Spring	Credits
MRKT 450	3	BUSN 489	4
300-400 Level Marketing Electives (2)	6	MRKT 460	3
300-400 Level Business Elective	3	300-400 Level Marketing Elective	3
300-400 Level Elective	3	300-400 Level Business Elective	3

Total Credits: 126

* At some time following the completion of BUSN 189 and prior to graduation, all College of Business students must register for and successfully complete BUSN 301 (0 credits).

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 adviser on a regular basis to review their plan of study.

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 online at: www.ndsu.edu/mgmt_mrkt. Please do so *before or when* taking MRKT 430 Sales and Personal Selling.

Certification Requirements

Professional Selling Certificate

Certificate Requirements

Required Credits: 16

Requirements

MRKT 320	Foundations of Marketing	3
MRKT 430	Sales and Personal Selling *	3
MRKT 434	Sales Management	3
BUSN 413	Business Internship **	3
MRKT 499	Special Topics	1

Electives

Select one of the following:		3
MGMT 451	Negotiation and Alternative Dispute Resolution	
MGMT 461	Supply Chain Management	
MRKT 470	Services Marketing	

Total Credits

16

* Optional co-requisite with MRKT 320

** Requires approval by College of Business Center for Professional Selling and Sales Technology

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 online at www.ndsu.edu/mgmt_mrkt. 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.

College of Engineering

Engineering Admin 203, 701-231-7525, www.ndsu.edu/coe

Vision

The College of Engineering will be nationally recognized for producing creative and innovative graduates and research to meet the changing needs of a global society.

Mission

- To serve the state of North Dakota, nation, and world through quality education, providing contributions to economic growth, and development of leading technology.
- To attract students and scholars with a vibrant culture of diversity, innovation, and entrepreneurship.
- To prepare students with the technical, communication, management, and leadership skills to succeed in a changing global environment.
- To have local, national, and global impact through research and other creative activities.
- To successfully compete among the top 20 programs nationally by discipline.

Departments

The departments include Agricultural and Biosystems Engineering, Civil and Environmental Engineering, 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 curricula of the college are reviewed periodically by the appropriate accreditation agency such as: ABET (Engineering Accreditation Commission) (www.abet.org) and the American Council for Construction Education (ACCE). These organizations are recognized national accrediting agencies for the engineering and construction management curricula.

Admission Requirements

Applicants for admission must satisfy the general admission requirements of the university and the special requirements of the college and department.

Recommended Preparation

Engineering programs encourage high school preparation in addition to the minimum core curriculum requirements. Prospective majors in engineering should present 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.

Selective Admission

Several programs within the College of Engineering have selective admission. Refer to the department program descriptions below for respective selective admission criteria.

Degree Programs

Undergraduate programs of study lead to the Bachelor of Science degree in the specific fields of agricultural and bio-systems engineering, civil engineering, computer engineering, construction engineering, construction management, electrical engineering, industrial engineering and management, manufacturing engineering, and mechanical engineering. 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 construction management and engineering. The classrooms and laboratories are well equipped and every effort is made to keep them abreast of current technology. 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 seniors are encouraged to take the examinations as soon as they are eligible.

All engineering departments have programs that lead to Master of Science and Doctor of Philosophy degrees. The Department of Construction Management and Engineering offers a Master of Science in Construction Management or a professional Master of Construction Management degree. The professional Master of Construction Management is also available on-line. 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. 573) online.

Degree Requirements

To earn a baccalaureate degree from any of the engineering programs or the construction management program, a student must complete at least 60 semester credits of professional-level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from the residence requirement, but are subject to NDSU's residence policy. Other exemptions must be approved by the college.

Special Opportunities and Services

Special opportunities include the following:

- **General Program:** The general program of the College of Engineering is designed to allow students, who have not chosen the branch of engineering they wish to study, to take basic courses for one year. Students are housed in Industrial Engineering until or unless they declare a different major. Students are encouraged to select an engineering curriculum as soon as possible, but no later than the end of their first year.
- **Interdisciplinary Program:** The Natural Resources Management program (p. 561) is available through the College of Agriculture, Food Systems, and Natural Resources, the College of Engineering, and the College of Science and Mathematics. Refer to the Interdisciplinary Programs (p. 548) section of this Bulletin for further information.

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 Engineers
- American Society of Civil Engineers
- American Society of Mechanical Engineers
- American Water Works Association/Water Environmental Federation (AWWA/WEF) (one group)
- Associated General Contractors
- Engineers Without Borders
- Engineering Council
- Institute of Electrical and Electronic Engineers
- Institute of Industrial Engineers
- Institute of Transportation Engineers
- Materials Research Society (MRS)
- National Association of Home Builders
- National Society of Black Engineers (NSBE)
- Society for the Advancement of Material and Process Engineering (SAMPE)
- Society of Automotive Engineers
- Society of Manufacturing Engineers
- Society of Plastics Engineers, Inc. (SPE)
- 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. The Engineering Council is composed of elected representatives from the student societies.

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 curricula, 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, and Pi Tau Sigma from mechanical engineering. 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.

The Engineering Extension provides special educational project services to groups in conferences, workshops, short courses, and publications. The laboratory facilities of the college are available for specialized instruction under the supervision of faculty. Organizations planning educational programs or special projects for their members are invited to consult the service for assistance. Extension also includes special assistance to companies to identify technology improvements and productivity enhancement.

Cooperative Education

Cooperative Education (<https://www.ndsu.edu/career/internshipprogram>), 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.

Interdisciplinary Programs

The following programs are interdisciplinary and are integrated with more than one college/departments within the University.

Great Plains Institute of Food Safety (p. 321)

Natural Resources Management (p. 339)

Faculty

- Abdelrahman, Magdy, Associate Professor of Civil Engineering, Ph.D., 1996, University of Illinois-Urbana
- Andersen, Donald A., Emeritus Professor of Civil Engineering, Eng.D., 1982, Texas A&M University
- Asa, Eric, Associate Professor of Construction Management and Engineering, Ph.D., 2002, University of Alberta
- Azarmi, Fardad, Associate Professor of Mechanical Engineering, Ph.D., 2007, University of Toronto
- Bai, Yong, Professor of Construction Management and Engineering, Department Chair, Ph.D., 1996, North Carolina State University
- Bajwa, Dilpreet, Associate Professor of Mechanical Engineering, Ph.D., 2000, University of Illinois, Urbana-Champaign
- Bajwa, Sreekala, Professor of Agricultural and Biosystems Engineering; Department Chair, Ph.D., 2000, University of Illinois, Urbana-Champaign
- Bares, William A., Emeritus Professor of Electrical Engineering, Ph.D., 1968, University of Wyoming
- Bezbaruah, Achintya, Associate Professor of Civil Engineering, Ph.D., 2002, University of Nebraska-Lincoln
- Bon, Thomas A., Associate Professor of Practice of Agricultural and Biosystems Engineering, Ph.D., 2003, North Dakota State University
- Bora, Ganesh, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2005, Kansas State University
- Bowen, Bradley, Assistant Professor of Construction Management and Engineering, Ph.D., 2010, North Carolina State University-Raleigh
- Braaten, Benjamin, Associate Professor of Electrical and Computer Engineering, Ph.D., 2009, North Dakota State University
- Cao, Dong, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2012, Michigan State University
- Chaudhuri, Nilanjan Ray, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2011, Imperial College of Science and Technology, University of London
- Chu, Xuefeng, Associate Professor of Civil Engineering, Ph.D., 2002, University of California-Davis
- Dawn, Debasis, Assistant Professor of Electrical and Computer Engineering, Ph.D., 1993, Georgia Institute of Technology
- Ewert, Dan, Professor of Electrical and Computer Engineering, Ph.D., 1989, University of North Dakota
- Farahmand, Kambiz, Professor of Industrial and Manufacturing Engineering, Ph.D., 1992, University of Texas-Arlington
- Gajan, Sivapalan, Associate Professor of Civil Engineering, Ph.D., 2006, University of California-Davis
- Gao, Zhili, Associate Professor of Construction Management and Engineering, Ph.D., 2004 Iowa State University
- Glower, Jacob, Associate Professor of Electrical and Computer Engineering; Ph.D., 1988, Ohio State University
- Gong, Na, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2013, New York State University-Buffalo
- Goplen, Sherman P., Associate Professor of Mechanical Engineering, Ph.D., 1977, Texas A&M University
- Green, Roger, Associate Professor of Electrical and Computer Engineering, Ph.D., 1998, University of Wyoming
- Hellevang, Kenneth J., Professor of Agricultural and Biosystems Engineering, Ph.D., 1989, North Dakota State University
- Henderson, Allen J., Emeritus Professor of Industrial and Manufacturing Engineering, Ph.D., 1968, Iowa State University
- Huang, Ying, Assistant Professor of Civil Engineering, Ph.D., 2012, Missouri University of Science and Technology
- Isgrig, Elvin, Emeritus Professor of Industrial and Manufacturing Engineering, M.S., 1983, North Dakota State University
- Jia, Xinhua, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Arizona
- Jiang, Long, Assistant Professor of Mechanical Engineering; Ph.D., 2003, Nanyang Technological University
- Kallmeyer, Alan R., Professor of Mechanical Engineering; Department Chair, Ph.D., 1995, University of Iowa
- Karami, Ghodrattollah, Professor of Mechanical Engineering and Associate Dean of Research, Ph.D., 1984, Imperial College of Science and Technology, University of London
- Karmakar, Sanjay, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2012, University of Colorado-Boulder

- Katti, Dinesh R., Professor of Civil Engineering; Department Chair, Ph.D., 1991, University of Arizona
- Katti, Kalpana, Distinguished Professor of Civil Engineering, Ph.D., 1996, University of Washington
- Kavasseri, Rajesh, Associate Professor of Electrical and Computer Engineering, Ph.D., 2002, Washington State University
- Khan, Eakalak, Professor of Civil Engineering, Ph.D., 1997, University of California - Los Angeles
- Khan, Samee, Associate Professor of Electrical and Computer Engineering, Ph.D., 2007, University of Texas-Arlington
- Khoda, Bashir, Assistant Professor of Industrial and Manufacturing Engineering, Ph.D., 2012, New York State University-Buffalo
- 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
- Krishnan, Sumathy, Professor of Mechanical Engineering, Ph.D., 1995, Indian Institute of Technology-Madras, India
- 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
- 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, Assistant Professor of Civil Engineering, Ph.D., 2010, University of Wisconsin-Milwaukee
- Lin, Zhulu, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2003, University of Georgia
- Marinov, Val, Professor of Industrial and Manufacturing Engineering, Ph.D., 1992, Technical University of Sofia, Bulgaria
- Maurer, Karl G., Emeritus Professor of Mechanical Engineering, Ph.D., 1966, University of Kansas
- Nawarathna, Dharmakeerthi, Assistant 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
- Padmanabhan, G., 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
- Pfister, Philip C., Emeritus Professor of Mechanical Engineering, Ph.D., 1962, Illinois Institute of Technology
- Pieri, Robert V., Professor of Mechanical Engineering, Ph.D., 1987, Carnegie-Mellon University
- Pratt, George L., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1967, Oklahoma State University
- Pryor, Scott W., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2005, Cornell University
- Rahman, Shafiqur, Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 2004, University of Manitoba
- Rieder, William G., Emeritus Professor of Mechanical Engineering, Ph.D., 1971, University of Nebraska-Lincoln
- Rogers, David A., Professor of Electrical and Computer Engineering, Ph.D., 1971, University of Washington
- Scherer, Thomas F., Associate Professor of Agricultural and Biosystems Engineering, Ph.D., 1986, University of Minnesota
- Schroeder, Mark, Assistant Professor of Practice of Electrical and Computer Engineering, Ph.D., 1999, University of Texas-Austin
- Selekwa, Majura, Associate Professor of Mechanical Engineering, Ph.D., 2001, Texas A&M University
- Simsek, Halis, Assistant Professor of Agricultural and Biosystems Engineering, Ph.D., 2012, North Dakota State University
- Sirotiak, Todd, Assistant Professor of Construction Management and Engineering, Ph.D., 2008, Iowa State University
- Smith, Scott, Professor of Electrical and Computer Engineering; Department Chair, Ph.D., 2001, University of Central Florida
- Solseng, Elton G., Instructor of Agricultural and Biosystems Engineering, M.S., 1980, North Dakota State University
- Song, Jongchul, Assistant Professor of Construction Management and Engineering, Ph.D., 2005, University of Texas
- 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
- Stegman, Earl C., Emeritus Professor of Agricultural and Biosystems Engineering, Ph.D., 1966, Michigan State University
- Stewart, Michael, Assistant Professor of Mechanical Engineering, Ph.D., 1979, University of Illinois-Urbana
- Stone, Matthew, Assistant Professor of Construction Management and Engineering, Ph.D., December 2013, University of Alabama
- Stuehm, Donald L., Emeritus Professor of Electrical and Computer Engineering, Ph.D., 1972, Colorado State 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
- Ulven, Chad, Associate Professor of Mechanical Engineering, Ph.D., 2005, University of Alabama-Birmingham
- Varma, Amiy, Associate Professor of Civil Engineering, Ph.D., 1993, Purdue University
- Wang, Jinhui, Assistant Professor of Electrical and Computer Engineering, Ph.D., 2010, University of Rochester
- Wang, Xinnan, Assistant Professor of Mechanical Engineering, Ph.D., 2008, University of South Carolina
- Wang, Yechun, Associate Professor of Mechanical Engineering, Ph.D., 2007, University of Maryland
- Wells, David L., Professor of Industrial and Manufacturing Engineering, Ph.D., 1996, University of Missouri-Rolla

- Wiesenborn, Dennis P., Professor of Agricultural and Biosystems Engineering, Ph.D., 1988, Rice University
- Wu, Xiangfa, Assistant Professor of Mechanical Engineering, Ph.D., 2003, University of Nebraska-Lincoln
- Yadav, Om P., Associate Professor of Industrial and Manufacturing Engineering, Interim Department Chair, Ph.D., 2002, Wayne State University
- Yang, Huojun, Assistant Professor of Construction Management and Engineering, Ph.D., 2012, University of Nebraska-Lincoln
- Yang, Mijia, Assistant Professor of Civil Engineering; Ph.D., 2005, University of Akron
- Yazdani, Siamak, Professor of Civil Engineering, Ph.D., 1987, University of New Mexico
- Ziejewski, Mariusz, Professor of Mechanical Engineering, Ph.D., 1986, North Dakota State University

Department of Aerospace Studies (Air Force ROTC)

www.ndsu.edu/afrotc

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.

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.

The initial assignment options available to the Air Force second lieutenant include the following:

1. Enter the Air 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 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. The student who chooses not to enroll in the GMC (first two years) may still earn a commission by enrolling in a special two-year program during the junior and senior years. Admission to this special program requires the student to make application early in the sophomore year. Qualified students will then participate in a six-week field-training program at an Air Force base the summer prior to their junior or senior year.

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.

Aerospace Studies (p. 295)

Aerospace Studies

Minor Requirements

Aerospace Studies Minor

Minor Requirements

Required Credits: 24

Required General Military Courses (Year 1-2)

AS 111	The Air Force Today I	1
AS 112	The Air Force Today II	1
AS 210	Leadership Laboratory (1 credit each semester)	4
AS 211	Evolution of USAF Air and Space Power I	1
AS 212	Evolution of USAF Air and Space Power II	1

Required Professional Office Courses (Years 3-4)

AS 321	Air Force Leadership Management I	3
AS 322	Air Force Leadership Management II	3
AS 410	Leadership Laboratory (1 credit each semester)	4

AS 441	Preparation For Active Duty I	3
AS 442	Preparation for Active Duty II	3
Total Credits		24

Minor Requirements and Notes

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

Department of Agricultural and Biosystems Engineering

www.ndsu.edu/aben

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 Engineering houses two separate majors; Agricultural and Biosystems Engineering (p. 296) and Agricultural Systems Management (p. 92). 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.

Our students are active in a variety of extra-curricular programs (<https://www.ndsu.edu/aben/clubs>). Feel free to view all we have to offer!

Agricultural and Biosystems Engineering - Agricultural concentration (p. 297)

Agricultural and Biosystems Engineering - Biosystems concentration (p. 303)

See College of Agriculture, Food Systems and Natural Resources for the Agricultural Systems Management major.

Agricultural and Biosystems Engineering

Agricultural and Biosystems Engineering Major

The Agricultural and Biosystems Engineering (ABEN) program prepares men and women for careers requiring application of physical, biological, and engineering sciences to develop solutions relating to: the design and production of machine systems; the production and handling of biological materials; processing of food, feed, fiber, and fuel; and the preservation of natural resources and environmental quality. A major in Agricultural and Biosystems Engineering can serve a broad range of career interests and can provide excellent career opportunities for men and women from diverse backgrounds.

The program educational objectives of this major are to educate and produce graduates who will become engineers who:

1. have the ability to use their technical knowledge and design and problem solving skills throughout their careers,
2. have the interpersonal and collaborative skills and the capacity necessary for productive careers, and
3. can use their disciplinary knowledge and educational depth and breadth to deal with changing career opportunities in agricultural and related industries.

These objectives support the department mission of developing and extending knowledge through engineering and technology that advances the productivity of agricultural production, the processing and utilization of biological materials, and the management of environmental resources.

Agricultural and biosystems engineering integrates engineering topics, engineering design, and biological sciences in a single program with two concentrations: agricultural engineering and biosystems engineering. While there is considerable overlap between the agricultural engineering (AGEN) and the biosystems engineering (BSEN) concentrations, the BSEN concentration includes a heavier emphasis on fundamental biological and chemical sciences. The AGEN concentration includes a heavier emphasis in the physical sciences. A wide range of electives in related disciplines can be used to compliment the disciplinary course work and to prepare for specific career interests. Although not required by the curriculum, students are encouraged to take advantage of Cooperative Education experiences or the opportunity of paid internships where they gain hands-on experience in engineering.

Agricultural Engineering Option

Career opportunities for graduates in agricultural engineering are many and diverse. Graduates may work for companies and agencies that design, develop, test, and manufacture power and machine systems; handle, store, and process agricultural commodities; design environmental controls and housing systems for plant and animal production; design equipment and systems for processing, manufacturing, distribution and quality protection of food products; design systems for management of air, land and water resources; design and manage crop irrigation systems; and develop electrical and electronic applications for agricultural problems. Graduates with an agricultural engineering concentration may also pursue graduate degrees in

engineering, business, or law. By selecting appropriate elective courses, students may emphasize areas such as agricultural systems, environmental systems, biomaterials and processing systems, or an emphasis area designed by the student in consultation with an adviser.

The faculty assist with career planning and job placement of graduates. Students interested in careers involving production, delivery, management, and technical support of systems for food, agricultural, or closely related industries rather than engineering or design should consider the Agricultural Systems Management major (p. 92) offered by the College of Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>).

Major Requirements

Major: Agricultural & Biosystems Engineering Option: Agricultural Engineering

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

Required Degree Credits to Graduate: 133

General Education Requirements

First Year Experience (F):

ABEN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take ABEN 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 321	Writing in the Technical Professions	
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ENGL 324	Writing in the Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121	General Chemistry I	3
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CHEM 122	General Chemistry II	3
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PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		42
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Major Requirements - Agricultural Option

General Education Requirements		40
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ABEN Core Courses:

ABEN 110	Introduction to Agricultural and Biosystems Engineering	2
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ABEN 255	Computer Aided Analysis & Design	3
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ABEN 263	Biological Materials Processing	3
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ABEN 377	Numerical Modeling in Agricultural and Biosystems Engineering	3
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ABEN 482	Instrumentation & Measurements	3
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ABEN 486	Design Project I	2
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ABEN 487	Design Project II	2
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ABEN 491	Seminar	1
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ABEN 496	Field Experience	1
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ABEN 300-400 Electives: Select 9 credits from the following:		9
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ABEN 358	Electric Energy Application in Agriculture	
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ABEN 383	Structural Design for Biosystems	
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ABEN 444	Transport Processes	
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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 Courses:		
MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME Courses:		
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
Additional Courses:		
CE 309	Fluid Mechanics	3
CE 310	Fluid Mechanics Laboratory	1
ECE 301	Electrical Engineering I	3
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	
Program Electives	The following program electives may be selected from courses listed in the Program Electives Tab above.	
Computer Electives	Select a minimum of 3 credits from the Program Electives Tab.	3
Business or Communication Elective	Choose one course from the following prefix options: BUSN, COMM, ACCT, AGECE, ECON, MGT, MIS, MRKT*	3
Chemistry/Biological Science Electives	Select a minimum of 9 credits from the Program Electives Tab.	9
Technical Electives	Select a minimum of 8 credits from the Program Electives Tab.	8
Total Credits		133

* 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 and Notes

A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college.

Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

Program Electives for ABEN:

Agricultural Option - Program Electives

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 455	Introduction to Geographic Information Systems
IME 380	CAD/CAM for Manufacturing
ME 213	Modeling of Engineering Systems

Business or Communication Elective: Choose one course from the following prefix options:

3

BUSN, COMM, ACCT, AGECE, ECON, MGT, MIS, MKT (The course used for this elective cannot double-count as General Education.)
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Chemistry/Biological Science Electives: Select 9 credits from the following:

9

ANSC 123	Feeds and Feeding
ANSC 220	Livestock Production
BIOL 111	Concepts of Biology
BIOL 111L	Concepts of Biology Lab
BIOL 124	Environmental Science
BIOL 124L	Environmental Science Laboratory
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
PLSC 110	World Food Crops
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
SOIL 480	Soils and Pollution

Technical Electives: May choose from the ABEN section, Chemistry/Biological Science electives or the Engineering electives listed below:

8

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 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 451	Advanced Surveying
CE 472	Solid Waste Management
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 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 455	Management of People Systems
IME 456	Program and Project Management
IME 461	Quality Assurance and Control
ME 331	Materials Science and Engineering
ME 341	Mechanics of Machinery
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
RNG 326	Modeling of Range and Agro-Ecosystems
STAT 461	Applied Regression Models
STAT 462	Introduction to Experimental Design

Total Credits**23**

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.
- **Biomaterials 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.

Agricultural Systems

ABEN 358	Electric Energy Application in Agriculture	3
ABEN 383	Structural Design for Biosystems	3
ABEN 444	Transport Processes	3
ABEN 452	Bioenvironmental Systems Design	3
ABEN 456	Biobased Energy	3
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	3
ABEN 464	Resource Conservation and Irrigation Engineering	4
ABEN 473	Agricultural Power	3
ABEN 478	Machinery Analysis & Design	3
ABEN/ME 479	Fluid Power Systems Design	3
ASM 323	Post-Harvest Technology	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 454	Principles and Application of Precision Agriculture	3
CE 343	Structural Engineering and Analysis	4
CE 404	Reinforced Concrete	3
ECE 275	Digital Design	3
ECE 303	Electrical Engineering II	3
ECE 376	Embedded Systems	4
GEOG 455	Introduction to Geographic Information Systems	4
GEOG 456	Advanced Geographic Information Systems	3
IME 330	Manufacturing Processes	3
IME 335	Welding Technology	3
IME 380	CAD/CAM for Manufacturing	3
IME 430	Process Engineering	3
IME 431	Production Engineering	3
IME 450	Systems Engineering and Management	3
IME 455	Management of People Systems	2
IME 456	Program and Project Management	3
IME 461	Quality Assurance and Control	3
ME 331	Materials Science and Engineering	4
ME 341	Mechanics of Machinery	3
ME 353	Thermodynamics II	3
ME 421	Theory of Vibrations	3
ME 442	Machine Design I	3
ME 454	Heat and Mass Transfer	3
ME 471	Experimental Stress Analysis	3
ME 473	Engineering with Polymeric Materials	3
ME 474	Mechanics of Composite Materials	3
ME 475	Automatic Controls	3
ME 487	Internal Combustion Engines	3

Environmental Systems

ABEN 358	Electric Energy Application in Agriculture	3
ABEN 444	Transport Processes	3
ABEN 450	Bioprocess Engineering	3
ABEN 452	Bioenvironmental Systems Design	3
ABEN 456	Biobased Energy	3
ABEN 464	Resource Conservation and Irrigation Engineering	4

ABEN 479	Fluid Power Systems Design	3
ABEN 484	Drainage and Wetland Engineering	3
ASM 454	Principles and Application of Precision Agriculture	3
CE 204	Surveying	4
CE 370	Introduction to Environmental Engineering	3
CE 371	Environmental Engineering Laboratory	1
CE 408	Water Resources and Supply	3
CE 410	Water and Wastewater Engineering	3
CE 421	Open Channel Flow	3
CE 451	Advanced Surveying	2
CE 472	Solid Waste Management	3
CE 473	Air Pollution	3
CE 477	Applied Hydrology	3
CE 478	Water Quality Management	3
CE 479	Advanced Water and Wastewater Treatment	3
CE 483	Contracts and Specifications	3
CHEM 240	Survey of Organic Chemistry	3
CHEM 341	Organic Chemistry I	3
CHEM 341L	Organic Chemistry I Laboratory	1
ECE 303	Electrical Engineering II	3
ME 454	Heat and Mass Transfer	3
MICR 350	General Microbiology	3
RNG 326	Modeling of Range and Agro-Ecosystems	3
SOIL 210	Introduction to Soil Science	3
SOIL 410	Soils and Land Use	3
SOIL 480	Soils and Pollution	3

Biomaterials Systems

ABEN 358	Electric Energy Application in Agriculture	3
ABEN 444	Transport Processes	3
ABEN 450	Bioprocess Engineering	3
ABEN 452	Bioenvironmental Systems Design	3
ABEN 456	Biobased Energy	3
ABEN 458	Process Engineering for Food, Biofuels and Bioproducts	3
ABEN 479	Fluid Power Systems Design	3
ABEN 484	Drainage and Wetland Engineering	3
BIOC 460	Foundations of Biochemistry and Molecular Biology I	3
BIOC 460L	Foundations of Biochemistry I Laboratory	1
CFS 210	Introduction to Food Science and Technology	2
CFS 430	Food Unit Operations	2
CFS 450	Cereal Technology	3
CFS 470	Food Processing II	3
CFS 471	Food Processing Laboratory	1
CHEM 240	Survey of Organic Chemistry	3
CHEM 341	Organic Chemistry I	3
CHEM 341L	Organic Chemistry I Laboratory	1
CHEM 342	Organic Chemistry II	3
ECE 303	Electrical Engineering II	3
IME 450	Systems Engineering and Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3-4
ME 331	Materials Science and Engineering	4

ME 442	Machine Design I	3
ME 454	Heat and Mass Transfer	3
MICR 350	General Microbiology	3

Agricultural & Biosystems Engineering - Biosystems Option

Agricultural and Biosystems Engineering Major

The Agricultural and Biosystems Engineering (ABEN) program prepares men and women for careers requiring application of physical, biological, and engineering sciences to develop solutions relating to: the design and production of machine systems; the production and handling of biological materials; processing of food, feed, fiber, and fuel; and the preservation of natural resources and environmental quality. A major in Agricultural and Biosystems Engineering can serve a broad range of career interests and can provide excellent career opportunities for men and women from diverse backgrounds.

The program educational objectives of this major are to educate and produce graduates who will become engineers who:

1. have the ability to use their technical knowledge and design and problem solving skills throughout their careers,
2. have the interpersonal and collaborative skills and the capacity necessary for productive careers, and
3. can use their disciplinary knowledge and educational depth and breadth to deal with changing career opportunities in agricultural and related industries.

These objectives support the department mission of developing and extending knowledge through engineering and technology that advances the productivity of agricultural production, the processing and utilization of biological materials, and the management of environmental resources.

Agricultural and biosystems engineering integrates engineering topics, engineering design, and biological sciences in a single program with two concentrations: agricultural engineering and biosystems engineering. While there is considerable overlap between the agricultural engineering (AGEN) and the biosystems engineering (BSEN) concentrations, the BSEN concentration includes a heavier emphasis on fundamental biological and chemical sciences. The AGEN concentration includes a heavier emphasis in the physical sciences. A wide range of electives in related disciplines can be used to compliment the disciplinary course work and to prepare for specific career interests. Although not required by the curriculum, students are encouraged to take advantage of Cooperative Education experiences or the opportunity of paid internships where they gain hands-on experience in engineering.

Biosystems Engineering Option

Graduates in biosystems engineering integrate engineering, biology, and chemistry in a variety of applications. Graduates may work in careers with the following goals: develop innovative green products and industries; convert bio-based resources to food, fuel, and other renewable products; design new generations of devices or systems for biological systems; and control biological systems for natural resource protection, waste remediation, and ecosystem restoration. Graduates may work with industries to create new and improved processes through the innovative use of microorganisms, plant and animal cells, and enzymes or they may develop sensors, control systems and computer models to monitor and control biological processes occurring in industry or the environment. Graduates with a biosystems engineering concentration may also pursue a professional or graduate degree in engineering, medicine, veterinary medicine, management, or law.

The faculty assist with career planning and job placement of graduates. Students interested in careers involving production, delivery, management, and technical support of systems for food, agricultural, or closely related industries rather than engineering or design should consider the Agricultural Systems Management major (p. 92) offered by the College of Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>).

Major Requirements

Major: Agricultural & Biosystems Engineering Option: Biosystems Engineering

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

Required Degree Credits to Graduate: 133

General Education Requirements

First Year Experience (F):

ABEN 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take ABEN 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One course in Upper Level Writing. Select one of the following:		3
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 459	Researching and Writing Grants and Proposal	

COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122L	General Chemistry II Laboratory	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

Major Requirements - Biosystems Option

General Education Requirements		40
ABEN Core Requirements:		
ABEN 110	Introduction to Agricultural and Biosystems Engineering	2
ABEN 255	Computer Aided Analysis & Design	3
ABEN 263	Biological Materials Processing	3
ABEN 444	Transport Processes	3
ABEN 482	Instrumentation & Measurements	3
ABEN 486	Design Project I	2
ABEN 487	Design Project II	2
ABEN 491	Seminar	1
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 Courses:		
MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME Courses:		
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
ME 350	Thermodynamics and Heat Transfer	3
Additional Courses:		
BIOL 150	General Biology I	3
CHEM 122	General Chemistry II	3

CHEM 240	Survey of Organic Chemistry	3
CE 309	Fluid Mechanics	3
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	
Program Electives	The following program electives may be selected from courses listed in the Program Electives Tab.	
Engineering Electives	Select a minimum of 9 credits from the Program Electives Tab.	9
Chemistry/Biological Science Electives	Select a minimum of 6 credits from the Program Electives Tab.	6
Technical Electives	Select elective courses from the Program Electives Tab.	7
Computer Elective	Select a minimum of 3 credits from the Program Electives Tab.	3
Total Credits		133

Degree Requirements and Notes

A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college.

Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.

Program Electives for ABEN:

Biosystems Option - Program Electives

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 460	Foundations of Biochemistry and Molecular Biology I	
BIOC 461	Foundations of Biochemistry and Molecular Biology II	
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	
BOT 314	Plant Systematics	
BOT 380	Plant Physiology	
BOT 460	Plant Ecology	
CHEM 260	Elements of Biochemistry	
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	
ZOO 370	Cell Biology	
Technical Electives: Select 7 credits from the following or from additional courses:		7
BIOC 473	Methods of Biochemical Research	
BIOC 474	Methods of Recombinant DNA Technology	
CFS 210	Introduction to Food Science and Technology	
CFS 370	Food Processing I	
CFS 450	Cereal Technology	
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		25

Department of Civil and Environmental Engineering

www.ndsu.edu/ce

The mission of the Department of Civil and Environmental Engineering is to provide quality education to prepare nationally competitive undergraduate students for a successful career in civil engineering; to provide advanced skills and knowledge in state-of-the-art research and design in sub-areas of civil engineering for graduate students; and to provide service to the university, engineering profession, and the public.

The following program education 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 have:

1. Established a mastery of fundamental knowledge, problem solving skills, engineering experimental abilities, and design capabilities for a civil engineering career and/or graduate school.
2. Established the knowledge and skills necessary for identifying and assessing design alternatives and the related social, economic, environmental, and public safety impacts.
3. Demonstrated their ability to deal effectively with ethical and professional issues, taking into account the broader societal implications of civil engineering.
4. Obtained or made progress for obtaining professional licensure, assumed or made progress toward assuming leadership roles, and engaged in life-long learning.

Civil engineering includes the planning, design, construction, maintenance, and operation of large and permanent projects of our civilization. Civil engineers are in demand wherever there are people. 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 Civil Engineering program at NDSU is accredited by the Engineering Accreditation Commission of the ABET (www.abet.org (<http://www.abet.org>)).

Civil Engineering (p. 306)

Civil Engineering

Civil Engineering Major

The Civil Engineering curriculum is designed to give students a strong mathematical, scientific and engineering background in all of the areas of the field. At the same time it provides students with an opportunity to place further emphasis on his/her chosen areas through technical electives.

Twelve credits of technical electives are required. Students are required to choose three technical electives from the five major areas, while at the same time satisfying the ABET design requirement. All Civil Engineering students must take a capstone design course, CE 489 Senior Design, which is designed to bring concepts learned in different courses to culminate in a major design experience.

Students interested in structural engineering may choose courses such as finite element analysis, advanced reinforced concrete, advanced steel design, timber design, pre-stressed concrete, foundation engineering, and dynamics of structures.

Students interested in water resources, or environmental engineering may choose courses such as solid waste management, applied hydrology, watershed modeling, ground water and seepage, water and wastewater engineering, open channel flow, hazardous waste management, and water quality management.

Students interested in transportation engineering may choose courses such as transportation planning, airport planning and design, railway planning and design, geometric highway design, or traffic engineering and pavement design.

Students interested in geotechnical engineering may choose courses in foundation engineering, earth slopes, and geosynthetics, earthquake engineering and advanced soil mechanics.

The curriculum includes a core of social humanistic subjects to provide the student with a background essential to a proper understanding of the role of engineering in society.

Students in Civil Engineering are strongly encouraged to participate in internships to enhance their classroom education with practical experience in engineering-related positions in industry.

Students transferring into Civil Engineering from other departments or institutions are encouraged to do so no later than the beginning of the junior year if they plan to complete the degree requirements within two academic years.

All Civil Engineering students at NDSU are required to have a minimum cumulative grade-point average of 2.0 for graduation and have received a grade of 'C' or better in the following courses and all prerequisites in sequence for these courses, before enrolling in any civil engineering courses that utilize these courses as prerequisites.

MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 128	Introduction to Linear Algebra	1
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 223	Mechanics of Materials	3

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. 573) online.

Major Requirements

Major: Civil Engineering

Degree Type: B.S.C.E.

Required Degree Credits to Graduate: 133

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I *	4
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
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CHEM 122	General Chemistry II	3
GEOL 105	Physical Geology	3
Humanities & Fine Arts (A):		
ENGR 311	History of Technology in America	3
Select from current general education list		3
Social & Behavioral Sciences (B):		
ENGR 312	Impact of Technology on Society	3
Select from current general education list		3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
GEOL 105	Physical Geology	3
Total Credits		41

Major Requirements

General Education Requirements		40
Civil Engineering Core Requirements		
CE 111	Introduction to Civil Engineering	2
CE 204	Surveying	4
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*:		
MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses :		
CHEM 122L	General Chemistry II Laboratory	1
ENGR 402	Engineering Ethics and Social Responsibility	1
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
ME 350	Thermodynamics and Heat Transfer	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 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 1.5)
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 1.0)
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)

Total Credits
133

* 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.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- **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.

Department of Construction Management and Engineering

www.ndsu.edu/construction

The first construction degree program at North Dakota State University (NDSU) was approved in 1969 by the North Dakota Board of Higher Education with the support of the Associated General Contractors (AGC) of North Dakota. Students began to be enrolled in the program in the fall semester of 1970. The Construction Management and Engineering (CM&E) Department was established at NDSU in 1978. In 1988, the Department was merged as a fully autonomous "Division" within Civil Engineering. The Civil Engineering Department was renamed as the Department of Civil Engineering and Construction. This structure remained in place until 2005, however, the construction programs were administered independently of Civil Engineering through the Division of Construction Management and Engineering. In 2005, the present Department of Construction Management and Engineering was established. Within the Department, the Program of Bachelor of Science in Construction Engineering is accredited by the Engineering Accreditation Commission of the ABET (<http://www.abet.org>). It is the third oldest Bachelor of Science in Construction Engineering program in the United States. The Program of Bachelor of Science in Construction Management is accredited by the American Council for Construction Education (<http://www.acce-hq.org>).

Department Vision

The Department of Construction Management and Engineering is an educational unit dedicated to the aspirations of students.

Department Mission Statement

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.

Department Values

1. Honor integrity
2. Respect diversity, individual rights, academic responsibility, and freedom
3. Believe in inclusion, transparency and communication
4. Commit to an excellent educational environment
5. Advance knowledge through basic and applied research
6. Serve communities, organizations, and societies

Construction Engineering (p. 310)

Construction Management (p. 312)

Construction Engineering

Construction Engineering Major

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 of Construction Management and Engineering offers a Bachelor of Science degree in Construction Engineering which offers a blend of engineering and construction courses. The program is designed for those who want to work in the construction industry and enjoy the status of 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 degree in Construction Engineering is accredited by the Engineering Accreditation Commission of the ABET (<http://www.abet.org>).

Educational Objectives

The Educational Objectives of the Construction Engineering Degree Program describe the career and professional accomplishments that we expect our graduates to achieve early in their careers. Within the first few (3-5) years after graduation, we expect our alumni:

- To maintain a sustained program of continuing education and life-long learning with a focus on contemporary issues.
- To be productive construction engineers and/or construction managers who are pursuing or have attained professional registration.

- To be effective communicators who work on multidisciplinary teams.
- To be engaged engineering professionals who are aware of and comprehend the ethical, social, environmental, and economic impacts of engineering solutions.
- To be engaged citizens who become involved and seek leadership roles in professional societies and community organizations.

Major Requirements

Major: Construction Engineering

Degree Type: B.S.Cons.E.

Required Degree Credits to Graduate: 131

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 320 or ENGL 321	Business and Professional Writing Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122	General Chemistry II	3
GEOL 105 or GEOL 106	Physical Geology The Earth Through Time	3

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ECON 105	Elements of Economics	3
General Education Elective		3

Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 105	Elements of Economics	3
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Total Credits		41
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major requirements

General Education Requirements		40
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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 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
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252	University Physics II	4
STAT 330	Introductory Statistics	3
Total Credits		131

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- A minimum 2.50 cumulative GPA is required for transfer students to be admitted to the B.S. in construction engineering program.

Construction Management

Construction Management Major

Construction management is a combination of technology, construction techniques, and management to meet the needs of the rapidly growing construction industry. The program is designed to prepare students for the art of achieving maximum profit by efficient use of people, machines, materials and money 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 Bachelor of Science in Construction Management Program is accredited by the American Council for Construction Education (<http://www.acce-hq.org>) .

The Pre-Program (Freshmen Level)

The Department of Construction Management and Engineering has a policy of no pre-selection for incoming freshmen. However, transfer students (internal and external) must have a cumulative grade point average (CGPA) of at least 2.50. New students are placed into the pre-professional plan of the program.

Professional Program (Sophomore, Junior and Senior Level)

Applications for admission to the Construction Management Professional Program will be approved subject to the following condition:

- The Construction Management Pre-Program must be completed with a cumulative grade point average (CGPA) of 2.75.

Graduation Requirement

Juniors and seniors are required to maintain a minimum CGPA to enroll in upper division courses offered by the College of Business (<http://www.ndsu.edu/business>). A minor in Business Administration with a CGPA of 2.50 is required to graduate with a B.S. in Construction Management.

Educational Objectives

1. Provide to construction students the basic skills necessary to plan, organize and control resources to manage the overall construction process.
2. Provide to construction students the technical knowledge and problem solving skills for a career in construction.
3. Provide to construction students the knowledge and skills necessary to identify, define and compare design alternatives.
4. Provide to construction students necessary communication skills for the successful practice of the construction profession.
5. Provide to construction students the professional opportunities and skills to pursue life-long learning within the broader societal context of the construction profession.

Major Requirements

Major: Construction Management

Degree Type: B.S.Cons.M.

Required Degree Credits to Graduate: 127

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189. (PP))	1
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Communication (C):

ENGL 110	College Composition I (PP)	3
ENGL 120	College Composition II (PP)	3
ENGL 320 or ENGL 321	Business and Professional Writing Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking (PP)	3

Quantitative Reasoning (R):

MATH 146	Applied Calculus I (PP)	4
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (PP)	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
GEOL 105	Physical Geology	3

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ECON 105	Elements of Economics (PP)	3
PSYC 111	Introduction to Psychology (PP)	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 105	Elements of Economics	
Total Credits		42
Major Requirements		
General Education Requirements		40
Construction Management Core Requirements		
CM&E 111	Introduction to Construction Management and Engineering (PP)	1
CM&E 200	Construction Documents and Codes (PP)	3
CM&E 203	Building Construction: Methods and Materials	3
CM&E 204	Construction Surveying	3
CM&E 212	Construction Graphic Communications (PP)	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 430	Land Development	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:		
BUSN 431	Business Law I-Contracts, Property and Torts	3
MATH 105	Trigonometry (PP)	3
or MATH 107	Precalculus	
STAT 330	Introductory Statistics	3
Business Minor Courses:		24
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		127

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- Admission to the Pre-Professional Construction Management program requires a 2.50 cumulative GPA in college-level coursework if a student transfers from another NDSU program or from another university.
- Admission to the Construction Management Professional program requires a 2.75 cumulative GPA.
- A minor in Business Administration with a CGPA of 2.50 is required to graduate with a B.S. in Construction Management.

Department of Electrical and Computer Engineering

www.ndsu.edu/ece

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 apply knowledge of mathematics, science, and engineering
- an ability to design and conduct experiments, as well as to analyze and interpret data
- an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- an ability to function on multidisciplinary teams
- an ability to identify, formulate, and solve engineering problems
- an understanding of professional and ethical responsibility
- an ability to communicate effectively
- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

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

Departmental admission requirements for freshmen are an ACT (or equivalent) math test score of 23. Transfer students from U.S. institutions must have a 2.30 GPA; transfer students from international institutions must have a 3.00 GPA.

Further, the department policy is that transfer credits with grades less than 'C' in biology, chemistry, computer science, any field of engineering class, mathematics and physics are not accepted for the Electrical and Computer Engineering curricula.

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:

All required mathematics courses through MATH 266

ECE 173	Introduction to Computing	3
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. 573) 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.

Computer Engineering (p. 316)

Electrical Engineering (p. 318)

Computer Engineering

Computer Engineering Major

The Computer Engineering program provides a background in three broad areas: computer hardware, software, and hardware-software integration. Fundamental computer topics included in the program are microprocessors, embedded systems, computer architecture, digital systems, data communications and other related computing material. In addition, the program includes core engineering subjects that are common to all engineering disciplines and basic university studies in humanities and social science. The Computer Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

Major Requirements

Major: Computer Engineering

Degree Type: B.S.Cpr.E.

Required Degree Credits to Graduate: 126

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3

Select one of the following:

ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 324	Writing in the Sciences	3
ENGL 459	Researching and Writing Grants and Proposal	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121	General Chemistry I	3
CHEM 121L	General Chemistry I Laboratory	1
or PHYS 251L	University Physics I Laboratory	1
CSCI 161	Computer Science II (This course is approved for computer engineering only)	4
PHYS 251	University Physics I	4

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 43

Major Requirements

General Education Requirements 40

Computer Engineering Core Requirements

ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	3
ECE 275	Digital Design *	4
ECE 320	Electronics I	3
ECE 341	Random Processes	3
ECE 343	Signals & Systems	4
ECE 374	Computer Organization	4
ECE 376	Embedded Systems	4

ECE 401	Design I (capstone)	1
ECE 403	Design II (capstone)	2
ECE 405	Design III (capstone)	3
ECE 474	Computer Architecture	3
ECE 475	Advanced Digital Design	4
Math Courses Required		
MATH 129	Basic Linear Algebra *	2
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	4
CSCI 222	Discrete Mathematics	3
CSCI 413	Principles of Software Engineering	3
CSCI 459	Foundations of Computer Networks	3
CSCI 474	Operating Systems Concepts	3
Other Courses Required		
EE 206	Circuit Analysis I *	4
ENGR 402	Engineering Ethics and Social Responsibility	1
ECE Electives	Select 6 cr. of ECE 400 level electives (excluding 494 and 496); may include CSCI 467	6
Includes the cross listed courses of ECE/IME 427; ECE/IME 429; ECE/PHYS 411; & ECE/PHYS 411L		
Tech Electives: Select 6 credits from the following:		6
CSCI 336	Theoretical Computer Science II	
CSCI 366	Database Systems	
CSCI 372	Comparative Programming Languages	
CSCI xx04	(Any CSCI 400 level didactic course)	
ECE 311	Circuit Analysis II	
ECE 321	Electronics II †	
ECE 351	Applied Electromagnetics	
ECE xx04	(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		126

* No grade less than a C accepted in these courses.

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- 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.
- 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.

Electrical Engineering

Electrical Engineering Major

The Electrical Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (<http://www.abet.org>).

EE 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:** This area is firmly based in engineering and the life sciences. The integration of medicine and engineering serves to provide appropriate products, tools, 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:** These 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:** This area involves hardware and software for small and large computers and for all the products that have dedicated computers within the product, such as microwave ovens and automobiles.
- **Control Engineering:** This is the design and implementation of algorithms for controlling physical systems. Examples include active suspension for cars, auto pilots for aircraft, and robot motion control.
- **Electromagnetics:** This area includes electromagnetic compatibility, fiber optics, antennas, microwave devices, radar, sonar, satellite systems, power and communication transmission lines, grounding, shielding, and propagation.
- **Electronics and Microelectronics:** Examples are integrated circuits, VLSI, transistors, lasers, consumer electronics, defense electronics, power electronics, and electronic materials.
- **Optical Engineering:** The Optical Engineering area was developed jointly with the Department of Physics (<https://www.ndsu.edu/physics>). The Optical Engineering area 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:** This area includes the generation, transmission, distribution, and utilization of electric energy subject to safety, environmental, and economic concerns.

Major Requirements

Major: Electrical Engineering

Degree Type: B.S.E.E.

Required Degree Credits to Graduate: 126

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of 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	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121	General Chemistry I	3
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PHYS 251	University Physics I	4
PHYS 252	University Physics II	4
Select one of the following co-req labs		1
CHEM 121L	General Chemistry I Laboratory	
PHYS 251L	University Physics I Laboratory	
PHYS 252L	University Physics II Laboratory	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		43

Major Requirements

General Education Requirements		40
Electrical Engineering Core Requirements		
ECE 111	Introduction to Electrical and Computer Engineering	3
ECE 173	Introduction to Computing *	3
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 *	2
MATH 166	Calculus II *	4
MATH 265	Calculus III (w/ vectors) *	4
MATH 266	Introduction to Differential Equations *	3
Other Courses Required		
EE 206	Circuit Analysis I *	4
ENGR 402	Engineering Ethics and Social Responsibility	1
ECE Electives		9
Includes the cross listed courses of ECE/IME 427; ECE/IME 429; ECE/PHYS 411; & ECE/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 II
CSCI 366	Database Systems
CSCI 372	Comparative Programming Languages
CSCI 426	Introduction to Artificial Intelligence
CSCI 458	Microcomputer 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 XX04	(Any ECE 400 level didactic course)
ECE 494	Individual Study (max. of 6 cr.)
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	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 I
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		126

* 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

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- 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>).

Great Plains Institute of Food Safety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Food Safety

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3

ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200 or CFS 210	Introduction to Food Systems Introduction to Food Science and Technology	2-3
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1

SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3
Supporting Courses		
BIOC 260	Elements of Biochemistry	3-4
or BIOC 460	Foundations of Biochemistry and Molecular Biology I	
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Degree Requirements: Potential of a minimum of 36 credits to reach 128.		36
Total Credits		128-135

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 7 credits from the following:		7
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	
COMM 486		
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 461	Business Continuity and Crisis Management	

HNES 141	Food Sanitation
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory
MICR 350 & 350L	General Microbiology and General Microbiology Lab
MICR 453	Food Microbiology
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory
MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
SAFE/COMM 485	Risk and Crisis Communication

Total Credits**16****Minor Requirements and Notes:**

- A minimum of 8 credits must be taken at NDSU

Department of Industrial and Manufacturing Engineering

www.ndsu.edu/ime

Two majors are offered within the Industrial and Manufacturing Engineering Department (IME): Industrial Engineering and Management (IE&M) and Manufacturing Engineering (MfgE). Both programs are professionally accredited by the Engineering Accreditation Commission of the ABET (www.abet.org (<http://www.abet.org>)).

Career positions for graduates of the two programs often have some similarity; so, many of the courses required for the two majors are the same. Industrial Engineering and Management encompasses manufacturing as well as service industries. Industrial engineers have the technical training to make improvements in a manufacturing setting as well as to evaluate and improve productivity and quality in service industries. Industrial and Manufacturing engineers apply scientific principles to the production of goods. They are key team members in 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 the processes to make products with the required functionality, to high quality standards, and available when and where customers prefer, at the best possible price.

In addition, both majors offer the student opportunities for specialization in the junior and senior years. IE&M students can apply their elective courses to extra study in production operations and management, healthcare management engineering, and reliability and quality management. MfgE students can elect additional specialization in additive manufacturing 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 done with industrial companies. Students interact with practicing professionals to learn the real-world applications of the theories they master in the classrooms. There also are many laboratories where students gain hands-on understanding of machinery and engineering systems. 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. As part of improving the quality of the programs offered, grades less than 'C' will not be accepted for chemistry, physics, and mathematics courses in the degree curricula.

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 prepared for careers that design, develop and implement devices, processes and systems that manufacture, construct, operate and service products, equipment and facilities 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. Graduates are in demand for employment in a very wide range of industries from production of all types of goods to transportation and distribution to information management, to healthcare to consulting.

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 make satisfying careers in organizations of all sizes and types, located in all parts of the world. Graduates generally have a wide choice in where they work and live, as well as the size and kind of company for which to work.

Post-graduate studies also are available in the IME department, leading to the Master of Science and Doctor of Philosophy degrees. For more complete details, see the Graduate Bulletin (p. 573) online.

Industrial Engineering and Management (p. 325)

Manufacturing Engineering (p. 329)

Industrial Engineering and Management

Industrial Engineering & Management Major

Industrial Engineering and Management (IE&M) is a good choice for people with the aptitude and interest for careers that blend technology and people. First, this is an engineering program, with the traditional content of mathematics, sciences, engineering analysis and design. Beyond the basics, this program also challenges students to integrate resources with technology. In addition to scientific principles and technological systems, IE&M students study people systems, cost analysis, facilities and other elements of the business enterprise. The "engineering" and "management" pieces are blended and integrated.

IE&M graduates are in high demand across a wide spectrum of industries. In recent years, the most active employers have represented manufacturing, healthcare, transportation, warehousing and distribution, information systems, software, facilities development and consulting industries, as well as many of the production sectors that have been the traditional concentration for industrial engineers. IE&M graduates are sought after for positions in design of products, processes, procedures, facilities, and systems; material handling, distribution, warehousing, and logistics; project and organizational management; financial modeling; and technological training.

Just as the profession requires a blend of scientific, technological and humanistic skills, student learning in IE&M is an integrated process. The discipline-specific courses place the student in position to experience many elements of real situations in industry and commerce. Moreover, the program has been nationally cited for integrating design across all levels, with freshmen and juniors or sophomores and seniors often working together.

The Industrial Engineering and Management program at NDSU is accredited by the Engineering Accreditation Commission of ABET (www.abet.org). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies. Graduates of the IE&M program will be able to:

1. Apply statistical, operations research and simulation tools to solve problems relevant to modern manufacturing, healthcare, production, commercial, social and/or governmental organizations, with principal emphasis on quality, productivity, continuous improvement, and enterprise integration.
2. Design processes and systems to effectively and economically employ and integrate technology and people in organizational environments in industrial, healthcare, logistics, service and/or governmental settings, with appropriate consideration for environmental factors, health and safety, manufacturability and ethical, economic, social and political issues.
3. Engage in effective learning in topics and areas relevant to professional advancement and to enhancing the quality of personal life.
4. Participate effectively in multidisciplinary teams in both leadership and followership roles.
5. Effectively communicate complex technological concepts, issues and professional details to a variety of audiences.

Industrial Engineering & Management Areas of Emphasis

Students majoring in Industrial Engineering and Management may prepare for specific career choices by careful use of the technical electives included in the IE&M major. All Industrial Engineering and Management majors choose a minimum of three technical elective courses. It is suggested that students confer with their academic adviser for assistance in choosing the most appropriate technical elective courses. Particular areas of emphasis may be selected in the following special interests: Management of people systems; Advanced manufacturing engineering; Healthcare management engineering; Production operations & management; Quality engineering & management; Reliability engineering; and Lean manufacturing.

These topical areas are also available for post-graduate study, leading to the Master of Science in Industrial Engineering and Management, Master of Science in Manufacturing Engineering, and the Doctor of Philosophy in Industrial and Manufacturing Engineering degrees. For complete details, see the Graduate Bulletin (p. 573) online.

Selective Admission

The Department of Industrial and Manufacturing Engineering has a selective admission policy. To be admitted to the program, freshman applicants must have a minimum high school GPA of 2.5 and a composite ACT score of 21 or higher. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average of at least 2.30.

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 multifunctional teams crucial to success in industry.

Minor in IE&M require a minimum of 18 credits. The foundation requirements for the IE&M minor are:

- IME 111 Introduction to Industrial and Manufacturing Engineering
- IME 311 Work/Station Design and Measurement

The remaining 12 credits must be selected from a list of approved IME 300- and 400-level courses for which prerequisites are in place.

Interested students are encouraged to visit the IME Department for advice on course selection to best suit their career interests. Students must complete the graduation requirements for another engineering major before the designation of the IE&M minor will be placed on their transcripts.

Industrial Engineering & Management Sequence for Non-Majors

The practices and procedures learned in the Industrial Engineering & Management major are universally applied in public and private organizations of all kinds. IE&M courses are available as electives for students majoring in other programs including engineering, computer science, mathematics, sciences, business administration, cereal science, and agricultural economics. Courses recommended for non-majors are:

IME 311	Work/Station Design and Measurement	3
IME 440	Engineering Economy	2-3
IME 450	Systems Engineering and Management	3
IME 451	Logistics Engineering and Management	3
IME 452	Integrated Industrial Information Systems	3
IME 453	Hospital Management Engineering	3
IME 455	Management of People Systems	2
IME 456	Program and Project Management	3
IME 460	Evaluation of Engineering Data	3
IME 461	Quality Assurance and Control	3
IME 462	Total Quality In Industrial Management	3
IME 463	Reliability Engineering	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	3
IME 482	Automated Manufacturing Systems	3
IME 485	Industrial and Manufacturing Facility Design	3

Major Requirements

Major: Industrial Engineering & Management

Degree Type: B.S.I.E.Mgt.

Required Degree Credits to Graduate: 131

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122	General Chemistry II	3
PHYS 252	University Physics II	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		42

Major Requirements

General Education Requirements		40
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 Courses Required:		
MATH 129	Basic Linear Algebra	2
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
ME Courses Required:		
ME 212	Fundamentals of Visual Communication for Engineers	3
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
Other Required Courses:		
ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252L	University Physics II Laboratory	1
Industrial Engineering and Management Electives		
Computer Science Electives: Select one of the following:		3
CSCI 122	Visual BASIC	
CSCI 126	Beginning FORTRAN	
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 451	Logistics Engineering and Management	
IME 452	Integrated Industrial Information Systems	
IME 453	Hospital Management Engineering	
IME 455	Management of People Systems	
IME 463	Reliability Engineering	
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**131-132**

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- 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

Industrial Engineering & Management Minor

Minor Requirements

Required Credits: 18

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	3
IME 451	Logistics Engineering and Management	3
IME 452	Integrated Industrial Information Systems	3
IME 453	Hospital Management Engineering	3
IME 455	Management of People Systems	2
IME 456	Program and Project Management	3
IME 461	Quality Assurance and Control	3

IME 462	Total Quality In Industrial Management	3
IME 463	Reliability Engineering	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

Minor Requirements and Notes

- A minimum of 8 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 Industrial Engineering & Management.

Manufacturing Engineering

Manufacturing Engineering Major

Manufacturing Engineering is a good choice for people who have both aptitude and interest in production of goods for improved living standard for the general populace. This career field is all about the production of goods—from automobiles and tractors and airplanes...to electronic products, recreational products, sports equipment, books and toys...to foodstuffs. Manufacturing engineers are employed in every industry that produces goods of some kind.

Manufacturing engineers may focus on the interaction between work piece and tool as process scientists or process engineers. They may concentrate on integrating the many different processes and parts necessary to make up finished products—as production engineers. Or, as manufacturing systems engineers, they may take a very wide view of the manufacturing enterprise, including its supply chain, distribution channels, financial structure and resource management. In every particular focus, manufacturing engineers are the people who design the processes through which products are made with the required functionality, to high quality standards, in the quantities needed, available when and where customers prefer, and at the best possible price.

Every day, manufacturing engineers make decisions about technology, machinery, people, and money. The preparation for the excitement and challenge of modern manufacturing requires students to master the mathematics and applied science common to all engineering disciplines. They then will master the fundamentals of process engineering and production engineering so that they may apply these principles to production of any type of goods.

The Manufacturing Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (www.abet.org). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies. Graduates of the Manufacturing Engineering program will be able to:

1. Solve problems relevant to modern manufacturing industries, with principal emphasis on process engineering and production engineering, as well as selected aspects of process science and the manufacturing enterprise.
2. Design competitive manufacturing processes and production systems, integrating machinery, technology, people and money, with appropriate consideration for environmental factors, health and safety, sustainability and ethical, economic, social and political issues.
3. Engage in effective learning in topics and areas relevant to professional advancement and to enhancing the quality of personal life.
4. Participate effectively in multi-disciplinary teams in both leadership and followership roles.
5. Effectively communicate complex technological concepts, issues and professional details to a variety of audiences.

Manufacturing Engineering graduates are well positioned to select career employment in any manufacturing industry. Graduates are actively recruited by companies that produce agricultural and construction machinery and vehicles, complex industrial apparatus, recreational vehicles, airplanes, household goods, building products, and both industrial and consumer electronics. Manufacturing Engineering graduates generally begin their careers designing processes and production systems or directly managing some phase of manufacturing. Frequently, they progress to increased responsibilities, with broader scope and yet more opportunity.

Manufacturing Engineering Areas of Emphasis

Students majoring in Manufacturing Engineering may prepare for specific career choices by careful use of the technical electives and the Engineering Science electives included in the Manufacturing Engineering major. It is suggested that students confer with their academic adviser for assistance in choosing the most appropriate optional courses. These topical areas also are available for post-graduate study, leading to Master of Science in Manufacturing Engineering, Master of Science in Industrial Engineering, and Doctor of Philosophy in Industrial and Manufacturing Engineering degrees. For more complete details, see the Graduate Bulletin (p. 573) online.

Selective Admission

The Department of Industrial and Manufacturing Engineering has a selective admission policy. To be admitted to the Manufacturing Engineering program, freshman applicants must have a minimum high school GPA of 2.5 and a composite ACT score of 21 or higher. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average of at least 2.30.

Manufacturing Sequences for Non-Majors

Most industrial enterprises engage in the production of some sort of goods in some way and to some degree. Students majoring in other disciplines can enhance their career value by expanding their knowledge of process engineering and production engineering. For students majoring in other engineering disciplines or in the agricultural or physical sciences, the technological foundations of manufacturing can be acquired through IME 330 Manufacturing Processes, IME 380 CAD/CAM for Manufacturing, IME 430 Process Engineering and IME 431 Production Engineering. Also, engineering majors from other disciplines may elect to acquire more depth through advanced manufacturing courses (IME 427 Packaging for Electronics, IME 432 Composite Materials Manufacturing, IME 433 Additive Manufacturing, IME 435 Plastics and Injection Molding Manufacturing, and IME 437 Methods for Precision Manufacturing).

Manufacturing Engineering Minor

Most industrial enterprises engage in the production of some sort of goods in some way and to some degree. Students majoring in other disciplines can enhance their career value by expanding their knowledge of the technologies, processes and systems of manufacturing. A minor in Manufacturing Engineering may be earned by any student in good standing and majoring in any engineering discipline or applicable agricultural or physical sciences. Students electing to pursue this minor will be expected to have achieved the necessary pre-requisite knowledge, consisting of basic calculus, statistics and physical sciences. Students completing a minor in Manufacturing Engineering will gain highly relevant understanding of the technologies, machine tools, fixturing and tooling, and production systems employed in the manufacture of a wide variety of goods used in modern society.

Interested students are encouraged to visit with relevant faculty in the IME Department for advice on course selection to best suit their career interests.

Major Requirements

Major: Manufacturing Engineering

Degree Type: B.S.Mfg.E.

Required Degree Credits to Graduate: 131

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122	General Chemistry II	3
PHYS 252	University Physics II	4

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 42

Major Requirements

General Education Requirements 40

Manufacturing Engineering Core Requirements

IME Courses Required:

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 Courses Required:

MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3

ME Courses Required:

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

Other Required Courses:

ENGR 402	Engineering Ethics and Social Responsibility	1
PHYS 252L	University Physics II Laboratory	1

Manufacturing Electives

Computer Science Electives: Select 3 credits from the following: 3

CSCI 122	Visual BASIC	
CSCI 126	Beginning FORTRAN	
CSCI 160	Computer Science I	
ECE 173	Introduction to Computing	

Engineering and Science Electives: Select 9 credits from the following:

CE 309	Fluid Mechanics	3
ME 350	Thermodynamics and Heat Transfer	3

Select one of the following:

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 Injection Molding Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 450	Systems Engineering and Management	
IME 451	Logistics Engineering and Management	
IME 452	Integrated Industrial Information Systems	

IME 455	Management of People Systems
IME 462	Total Quality In Industrial Management
IME 463	Reliability Engineering
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

Degree Requirements and Notes

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- 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

Manufacturing Engineering Minor

Minor Requirements

Required Credits: 18

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 Injection Molding Manufacturing	
IME 437	Methods for Precision Manufacturing	
IME 461	Quality Assurance and Control	
IME 482	Automated Manufacturing Systems	

Total Credits

18

Minor Requirements and Notes

- A minimum of 8 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.

Department of Mechanical Engineering

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, and systems that function safely, reliably, and efficiently to serve 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 that deal with aerospace, transportation, petroleum, biomedical products, 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 devices 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:

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. 69) 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://www.ndsu.edu/career/internshipprogram>) 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.

Mechanical Engineering (p. 333)

Mechanical Engineering

Mechanical Engineering Major

The Mechanical Engineering program at NDSU is accredited by the Engineering Accreditation Commission of ABET (www.abet.org (<http://www.abet.org>)). The curriculum is designed to produce baccalaureate-level graduates who are well prepared to accept engineering positions in industry and government or to pursue advanced degree studies.

Mission

The Department of Mechanical Engineering at NDSU will contribute to the aspirations of a land-grant university in the three primary components of education, research, and service. In support of these endeavors the mission of the department is to:

- Educate undergraduate and graduate students in the fundamentals of the discipline, prepare graduates to effectively function in society in the field of their choice, and provide the learning skills to adapt to evolving personal and professional goals.
- Develop and maintain high quality research programs in traditional and emerging areas that build on the diverse strengths of the faculty, foster interdisciplinary collaborations, and address national and global needs.
- Serve the needs of the profession, the state of North Dakota, and regional industries to promote and enhance economic development opportunities.

Educational Objectives

Within a few years of graduation, alumni of the mechanical engineering program at NDSU are expected to have:

1. Maintained an ability and willingness to adapt to emerging technologies through continued professional development
2. Provided contributions to the engineering profession in the field of their choice
3. Demonstrated a commitment to uphold high ethical and professional standards in the practice of engineering
4. Exhibited their ability to function in a team environment and interact with people of diverse backgrounds
5. Shown a commitment to be engaged and conscientious practitioners who understand the context in which their designs are implemented and the corresponding impact of their activities on society

A complete listing of the student outcomes associated with these objectives can be viewed on the department's web site (<https://www.ndsu.edu/me>).

Strong program emphasis is placed on engineering science, laboratory, and design. The use of modern computer tools and techniques in engineering practice also is incorporated throughout the curriculum. In addition, liberal arts education is included to prepare graduates for becoming concerned and productive members of society.

Students transferring into mechanical engineering from other departments or institutions are encouraged to do so no later than the beginning of the junior year if they wish to complete the degree requirements within two academic years.

Graduate programs leading to Master of Science and Doctor of Philosophy degrees in Mechanical Engineering are offered by the department. For more complete details, see the Graduate Bulletin (p. 573) online.

Selective Admission

The Department of Mechanical Engineering has a selective admission policy. To be admitted to the basic program (freshman and sophomore level), freshman applicants must either rank in the top one-third of their high school graduating class or have received a score of 26 or higher in the math portion of the ACT. Transfer students, whether from another university or from another department at NDSU, must have an institutional grade point average (GPA) of at least 2.80.

To enter the professional program (junior and senior level), students must complete the basic program with a minimum Engineering GPA of 2.80, a minimum Cumulative GPA of 2.50 and no grades below 'C' in any one of the core courses.

A minimum institutional GPA of 2.50 is required for graduation from Mechanical Engineering. No course grades less than 'C' are acceptable to fulfill a program requirement.

Curriculum

All Mechanical Engineering majors choose a minimum of five technical elective courses. These courses cover a wide range of topics and students may tailor their choices to reflect their special interests in solid mechanics and design, thermal sciences, materials and nanotechnology, injection molding, biomechanical engineering, or other areas as added in the future. For a complete list of technical electives available in each area, students should consult with their adviser, the department, or the curriculum guide.

Major Requirements

Major: Mechanical Engineering

Degree Type: B.S.M.E.

Required Degree Credits to Graduate: 130

General Education Requirements

First Year Experience (F):

UNIV/ME 189	Skills For Academic Success	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

CHEM 121	General Chemistry I	3
CHEM 122	General Chemistry II	3
PHYS 252	University Physics II	4
PHYS 252L	University Physics II Laboratory	1

Humanities & Fine Arts (A): Select from the current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from the current general education list 2

Cultural Diversity (D): Select from the current general education list

Global Perspectives (G): Select from the current general education list

Total Credits 42

General Education Requirements 40

Mechanical Engineering Requirements:

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	Introduction to Mechanical Engineering Profession	1
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 Courses Required:		
MATH 129	Basic Linear Algebra	2
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
MATH 266	Introduction to Differential Equations	3
Other Required Courses:		
ECE 301	Electrical Engineering I	3
ECE 303	Electrical Engineering II	3
ECE 306	Electrical Engineering Lab I	1
ENGR 402	Engineering Ethics and Social Responsibility	1
IME 330	Manufacturing Processes	3
Technical Electives: Select 15 credits from the following:		15
ME 332	Engineering Materials II	
ME 341	Mechanics of Machinery	
ME 353	Thermodynamics II	
ME 415	Emerging Technologies in Mechanical Engineering	
ME 423	Intermediate Mechanics of Materials	
ME 433	Composite Materials Science and Engineering	
ME 435	Plastics and Injection Molding Manufacturing	
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 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	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 two courses from the following:	
ABEN 456	Biobased Energy
CPM 473	Polymer Synthesis
CPM 474	Coatings I
CPM 475	Coatings II
CPM 486	Corrosion and Materials
ECE 487	Cardiovascular Engineering
ECE 488	Cardiovascular Engineering II
IME 430	Process Engineering
IME 431	Production Engineering
IME 432	Composite Materials Manufacturing
IME 440	Engineering Economy
IME 460	Evaluation of Engineering Data
PHYS 350	Modern Physics
PHYS 361	Electromagnetic Theory
PHYS 485	Quantum Mechanics I
Courses cross-listed with other departments:	
ME 435/IME 635	Plastics and Injection Molding Manufacturing
ME/ABEN 479	Fluid Power Systems Design
ME 486/CE 686	Nanotechnology and Nanomaterials

Total Credits**130****Degree Requirements and Notes**

- A student must complete at least 60 semester credits of professional level course work in his/her program while in residence and enrolled in the college. Students transferring into the college from programs with professional accreditation are exempt from this residency requirement but are subject to the residency requirement of NDSU.
- No grades less than 'C' will be accepted to fulfill a course requirement.
- No more than six credits of approved technical electives may be taken outside the ME department.
- Admission to the Mechanical Engineering Professional program requires a minimum 2.80 Engineering GPA and a minimum 2.50 Cumulative GPA.
- A 2.50 cumulative GPA is required for graduation requirements.

Freshman			
Fall	Credits	Spring	Credits
MATH 165	4	MATH 166	4
ENGL 110	3	ENGL 120	3
CHEM 121	3	CHEM 122	3
ME 189	1	ME 212	3
Humanities Elective (Select from approved gen ed list)	3	ME 221	3
Social Sci. Elective (Select from approved gen ed list)	3	Wellness (Select from approved gen ed list)	2
	17		18

Sophomore			
Fall	Credits	Spring	Credits
MATH 129	2	MATH 266	3
MATH 259	3	COMM 110	3
IME 330	3	PHYS 252	4

ME 222	3	PHYS 252L	1
ME 223	3	ME 213	3
Humanities Elective (Select from approved gen ed list)	3	ME 351	3
17			17

Junior			
Fall	Credits	Spring	Credits
ECE 301	3	ECE 303	3
ENGL 321	3	ECE 306	1
ME 331	4	ENGR 402	1
ME 352	3	ME 361	1
Technical Elective (Select from approved list)	3	ME 442	3
		ME 454	3
		Technical Elective (Select from approved list)	3
16			15

Senior			
Fall	Credits	Spring	Credits
ME 421	3	ME 412	3
ME 443	3	ME 462	3
ME 457	3	Technical Elective (Select from approved list)	3
ME 461	3	Technical Elective (Select from approved list)	3
Technical Elective (Select from approved list)	3	Social Sci. Elective (Select from approved gen ed list)	3
15			15

Total Credits: 130

Department of Military Science (Army ROTC)

www.ndsu.edu/armyrotc

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 22 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 29-day Cadet Initial Entry Training (CIET+), 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 29-day Cadet Initial Entry Training (CIET) between the first and second year of the basic course. Advanced Cadets attend a 29-day Cadet Leader Course (CLC) between the first and second year of the advanced course. Both of these courses are held at Ft. Knox, Kentucky (near Louisville). The Cadet Leader Course 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.

Four-, three-, and two-year Army ROTC scholarships are available, which provide for payment of tuition and fees. 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.

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, 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>).

Military Science (p. 338)

Military Science

Minor Requirements

Military Science Minor

Minor Requirements

Required Credits: 19-25*

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 (3)
HIST 104	U.S. Since 1877 (3)
HIST 422	U.S. History 1829-1917 I (3)
HIST 424	U.S. History 1917-Present I (3)

Concordia Courses:

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)	
HIST 122	U.S. History II (3)	
Total Credits		25

* MS 101-202 may be waived with the completion of military basic training. See department for waiver information. If waiver is applied, this minor is a minimum of 19 credits.

Minor Requirements and Notes

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

Natural Resources Management

With increasing human pressure and a growing need to balance competing demands, our world needs new and better ways to manage society's impacts on the environment. The Natural Resources Management program prepares students for challenging careers requiring the sustainability perspective and global social perspective necessary for examining and solving complex natural resources management problems. Our goal is the highest and best societal uses of natural resources while maintaining the integrity of life-sustaining socio-ecological systems. Career opportunities abound in federal, state and local government, the private sector, non-profit conservation and environmental organizations, as well as higher education and research.

An interdisciplinary major in NRM leads to a Bachelor of Science (B.S.) degree. Students benefit from faculty engagement from the various colleges across the university in the coordination of the program, classroom teaching and advising.

During the first four semesters of the NRM program, students complete a broad foundation of core courses in the social, biological, and physical sciences. The second half of the program offers students the opportunity to focus on a specific area of interest (emphasis). NRM offers six emphasis areas, each allowing students the flexibility to select courses for specialized career preparation.

- **Biotic Resources Science:** deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of both natural and agro-ecosystems.
- **Environmental Communication:** is designed for environmentally oriented students preparing for careers in communication fields such as journalism, public relations, broadcast media and the internet.
- **Natural Resources Economics:** prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of natural resources management and allocation.
- **Physical/Earth Resources Science:** leads to an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, energy resources and land-use management.
- **Pollution Control:** focuses on the principles and practices of managing natural resources for pollution control. Topics include the technical aspects of pollution as they relate to water, air/solids, earth/soils, and the impact of environmental pollution on biotic factors. Students interested in this emphasis are strongly urged to complete College Algebra before entering the NRM program.
- **Social Sciences:** concentrates on human factors (social, political, anthropological) in environmental management and environmental disaster management, while recognizing constraints and opportunities presented by physical and biological factors.

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3

ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
GEOL 105	Physical Geology	3
NRM 225	Natural Resources & Agrosystems	3
Humanities & Fine Arts (A): Select from current general education list		
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
Select one of the following:		3
POLS 110	Introduction to Political Science	
SOC 110	Introduction to Sociology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
ANTH 111	Introduction to Anthropology	
Wellness (W): Select from current general education list		
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
GEOL 105	Physical Geology	3
Total Credits		40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
NRM 150	Natural Resource Management Orientation	1
NRM/SOIL 264	Natural Resource Management Systems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
POLS 115 or POLS 215	American Government Problems and Policies In American Government	3
RNG 452 or GEOG 455	Geographic Information Systems in Range Survey Introduction to Geographic Information Systems	3
Select one of the following:		3
SOC 431	Environmental Sociology	
POLS 360	Principles of Public Administration	
POLS 422	State and Local Politics	
POLS 442	Global Policy Issues	
ANTH 462	Anthropology and the Environment	
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
SOIL 210	Introduction to Soil Science	

NRM Emphasis Area: Students must select one of the six NRM emphasis areas to complete the major. See below.	38
Degree Requirements: Potential of a minimum of 12 credits to reach 128.	12
Total Credits	123

Natural Resources Management Emphasis Areas

- Select and complete one emphasis area as part of the Natural Resources Management major.
- Declaring an Emphasis- Students should formally declare an emphasis area with the Office of Registration & Records (<https://www.ndsu.edu/registrar>) by the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Biotic Resources Science

Code	Title	Credits
Required. Select two of the following:		6
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
RNG 336	Introduction to Range Management	
RNG/NRM 453	Rangeland Resources Watershed Management	
Select a minimum of 32 credits from the approved electives list below for Biotic Resources:		32
BOT 314	Plant Systematics	
RNG 456	Range Habitat Management	
SOIL 217	Introduction to Meteorology & Climatology	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
PLSC 219	Introduction to Prairie & Community Forestry	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
PLSC/BOT/ZOO 315	Genetics	
PLSC/BOT/ZOO 315L	Genetics Laboratory	
RNG/NRM 454	Wetland Resources Management	
BOT/RNG 460	Plant Ecology	
MICR 202	Introductory Microbiology	
ZOO 450	Invertebrate Zoology	
ZOO 454	Herpetology	
ZOO 458	Mammalogy	
PLSC 355	Woody Landscape Plants	
RNG/BOT 450	Range Plants	
BOT 380	Plant Physiology	
RNG 458	Grazing Ecology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 477	Wildlife and Fisheries Management Techniques	
ENT 350	General Entomology	
ZOO 360	Animal Behavior	
ZOO 452	Ichthyology	
ZOO 456	Ornithology	
PLSC 323	Principles of Weed Science	
RNG 326	Modeling of Range and Agro-Ecosystems	
Total Credits		38

Physical/earth Resources Science

Code	Title	Credits
Required:		
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
GEOL 412 or SOIL 444	Geomorphology Soil Genesis and Survey	3
Select a minimum of 27 credits from the approved electives list below for Physical/Earth Resources Science:		27
ABEN 464	Resource Conservation and Irrigation Engineering	
ASM 354	Electricity and Electronic Applications	
RNG 336	Introduction to Range Management	
GEOL 105L	Physical Geology Lab	
GEOL 412	Geomorphology	
SOIL 444	Soil Genesis and Survey	
NRM 401	Urban-Ecosystem Management	
RNG/NRM 454	Wetland Resources Management	
NRM 420	Scenarios in Natural Resources Management	
PHYS 211	College Physics I	
CE 204	Surveying	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 410	Soils and Land Use	
MICR 202	Introductory Microbiology	
SOIL 465	Soil And Plant Analysis	
GEOL/CHEM 428	Geochemistry	
ASM 225	Computer Applications in Agricultural Systems Management	
PHYS 211L	College Physics I Laboratory	
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
GEOL 414	Hydrogeology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ASM 454	Principles and Application of Precision Agriculture	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 351	Soil Ecology	
SOIL 433	Soil Physics	
SOIL 447	Microclimatology	
SOIL 480	Soils and Pollution	

Total Credits**38****Environmental Communication**

Code	Title	Credits
Required:		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
Select one of the following:		4
COMM/POLS/CJ 325	Applied Research Methods	
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	

Select a minimum of 22 credits from the approved electives list below for Environmental Communication: 22

COMM 245	Principles of Broadcast Production
COMM 260	Introduction to Web Design
COMM 301	Rhetorical Traditions
NRM 420	Scenarios in Natural Resources Management
COMM 433	Legal Communication
COMM 442	Digital Media and Society
COMM 445	Advanced Broadcast Production
COMM 472	Public Relations Campaigns
COMM 402	Contemporary Rhetoric
COMM 261	Introduction to Web Development
COMM 310	Advanced Media Writing
COMM 362	Principles of Design For Print
COMM 383	Organizational Communication I
NRM 421	Environmental Outreach Methods
COMM 436	Issues in Mass Communications
COMM 443	Mass Media and Public Opinion
COMM 450	Issues in Communication
COMM 431	Communication Ethics and Law

Total Credits 38

Pollution Control

Code	Title	Credits
Required:		
CE 309	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
CE 408	Water Resources and Supply	3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 165	Calculus I	4
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3

Select a minimum of 15 credits from the approved electives list below for Pollution Control: 15

Air/Solids:		
CE 472	Solid Waste Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 447	Microclimatology	
Biotic:		
ABEN 499	Special Topics	
BOT 380	Plant Physiology	
BOT/RNG 460	Plant Ecology	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
Earth/Soils:		
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	

SOIL 433	Soil Physics
SOIL 444	Soil Genesis and Survey
SOIL 447	Microclimatology
SOIL 465	Soil And Plant Analysis
SOIL 480	Soils and Pollution
Water:	
ABEN 464	Resource Conservation and Irrigation Engineering
CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 477	Applied Hydrology
CE 478	Water Quality Management
GEOL 414	Hydrogeology
RNG/NRM 453	Rangeland Resources Watershed Management
GEOL/CHEM 428	Geochemistry
Total Credits	38

Natural Resources Economics

Code	Title	Credits
Required:		
MATH 146	Applied Calculus I	4
or MATH 165	Calculus I	
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Select a minimum of 29 credits from the approved electives list below for Natural Resources Economics:		29
AGEC 339	Quantitative Methods & Decision Making	
AGEC 375	Applied Agricultural Law	
ECON 202	Principles of Macroeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 456	History of Economic Thought	
ECON 470	Public Economics	
ECON 480	Industrial Organization	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
POLS 220	International Politics	
POLS 442	Global Policy Issues	
POLS 452	Comparative Political Economy	
SOC 403	Sociology of The Great Plains	
SOC 439	Social Change	
AGEC 347	Principles of Real Estate	
AGEC 484	Agricultural Policy	
COMM 315	Small Group Communication	
ECON 324	Money and Banking	
ECON 410	Econometrics	
ECON 461	Economic Development	
ECON 472	International Trade	
HNES 427	Leisure And Society	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
POLS 360	Principles of Public Administration	
POLS 444	International Law	
POLS 453	Environmental Policy and Politics	

SOC 431	Environmental Sociology	
Total Credits		38

Social Sciences

Code	Title	Credits
Required:		
SOC 405	Community Development	3
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	4
Select a minimum of 31 credits from the approved electives list below for Social Science:		31
ANTH 204	Archaeology and Prehistory	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ANTH 446	Latin America & Caribbean: Afro-Latino/as, Gender, Indigeneity	
CJ 201	Introduction to Criminal Justice	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 481	Disaster Analysis	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 421	Environmental Outreach Methods	
POLS 225	Comparative Politics	
POLS 422	State and Local Politics	
SOC 403	Sociology of The Great Plains	
SOC 422	Development Of Social Theory	
or ANTH 480	Development of Anthropological Theory	
SOC 418	Social Psychology	
SOC 431	Environmental Sociology	
SOC 443	International Disasters	
ANTH 205	Human Origins	
ANTH 433	Apes and Human Evolution	
ANTH 462	Anthropology and the Environment	
ANTH 481	Qualitative Methods in Cultural Anthropology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 262	Disaster Mitigation	
EMGT 264	Disaster Recovery	
EMGT 463	Voluntary Agency Disaster Services	
ENGL 474	Native American Literature	
NRM 420	Scenarios in Natural Resources Management	
POLS 215	Problems and Policies In American Government	
POLS 360	Principles of Public Administration	
POLS 453	Environmental Policy and Politics	
SOC 439	Social Change	
SOC 465	Applied Demographics	
Total Credits		38

Degree Notes:

- **Acceptable Substitutions:** The following courses are accepted as electives in all emphasis areas: NRM courses (may not be double-counted with the NRM Core); a maximum of 3 credits of Field Experience (396/496); a maximum of 3 credits of Co-op Ed (397/497). **All other substitutions require NRM advisor approval and a substitution form to be completed and submitted to the Office of Registration and Records** (<https://www.ndsu.edu/registrar>).

Minor Requirements

Natural Resources Management Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Core Courses		
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
Interdisciplinary Courses		
Select four of the following:		12
ASM/NRM/SOIL 264	Natural Resource Management Systems	
BIOL/ZOO 364	General Ecology	
BOT/RNG 460	Plant Ecology	
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	
NRM 421	Environmental Outreach Methods	
NRM/RNG 453	Rangeland Resource/Watershed Management	
RNG 336	Introduction to Range Management	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
SOC 431	Environmental Sociology	
POLS 453	Environmental Policy and Politics	
RNG 452	Geographic Information Systems in Range Survey (RNG 452 changing to NRM 452 GIS in NRM)	
SOIL 410	Soils and Land Use	
SOC 405	Community Development	
ZOO 476	Wildlife Ecology and Management	

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.

College of Health Professions

Charles D. Peterson

Sudro Hall 123, 701-231-7456, www.ndsu.edu/healthprofessions/

The College of Health Professions at North Dakota State University has provided an education for men and women in pharmacy and the pharmaceutical sciences since 1902. In the fall of 1990, a six-year entry-level Doctor of Pharmacy (Pharm.D.) program was implemented.

The college introduced an associate degree nursing program in 1969, which was discontinued in 1987. In 1986, the college initiated a four-year baccalaureate degree program in nursing.

Baccalaureate degree programs in the allied health fields of medical laboratory science, respiratory care, and radiologic sciences joined the college in 2006.

The college added coursework in the field of public health in 2011.

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 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 Masters of Public Health (MPH) and a Ph.D. in Pharmaceutical Sciences also are available.

The baccalaureate nursing program is a four year course of study leading to a Bachelor of Science in Nursing (BSN) degree. Graduates are eligible to apply for admission to take the national licensing examination (NCLEX) to become a registered nurse (RN). Graduate programs leading to a Master of Science in Nursing (MS) and a Doctor of Nursing Practice (DNP) also are available.

Degree plans for a Bachelor of Science major in Medical Laboratory Science (MLS), Respiratory Care (RC) and Radiologic Sciences (RS) include academic course work on campus and a professional-level internship in an affiliated, accredited hospital-based program. Required internships are 12 months in length for MLS, 15 months for RC, and two years for RS. Graduates are eligible to write national certifying examinations.

Academic Preparation

Certain preparation in addition to the minimum core curriculum requirements is advisable if a student is to enter easily and progress smoothly through a particular university curriculum.

All students must complete all required courses with a grade of 'C' or above. All students must 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 course work 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 is 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 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 the January 1 application.) Actual admission GPA is generally much higher than 3.00. Applications for admission to the professional program must be made by December 31 for fall semester admission. All applicants will receive notice of their status in April.

Nursing

Students may apply for admission into the Nursing program upon satisfactory completion of the prerequisite courses. Admission to the program is competitive and based upon academic achievement and other pertinent information. In addition, students must comply with criminal background and student conduct requirements. Applications for admission to the baccalaureate program should be made by April 20th for the class beginning in the fall semester of the sophomore year or September 20 for the class beginning the spring semester of the sophomore year. Applicants will receive notification by letter during July and October regarding their admission status. Please visit the Nursing website (<https://www.ndsu.edu/nursing>) for more information on admissions.

Medical Laboratory Science

NDSU maintains affiliation agreements with seven hospital-based medical laboratory science programs that provide the necessary internship. Students who have completed the pre-requisite work on campus and meet the GPA requirements established by affiliated hospital programs may be eligible to apply for the 12-month internships. Transfer students must complete a minimum of 20 resident credits at NDSU. Admission into the internship is competitive and based upon academic achievement, references, related experience, and an interview. In addition, student applicants must also comply with criminal background and student conduct requirements. Applications for the internship are due to the Department of Allied Sciences

(<https://www.ndsu.edu/alliedsciences>) by September 30, however, application deadlines vary among affiliated programs. 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

NDSU maintains affiliations with ten hospital-based radiologic technology programs that provide the internship. Students who have completed the prerequisite course work on campus and meet the GPA requirements established by affiliated hospital programs may be eligible to apply for the two-year internship. Transfer students must complete a minimum of 20 resident credits at NDSU. Admission into the internship is competitive and based upon academic achievement, references, related experience, and an interview. In addition, students must comply with criminal background and student conduct requirements. Applications for the internship are due to the Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences>) by December 1, however, application deadlines vary among affiliated programs. 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

Students eligible for application to the Sanford RC program internship will have completed all prerequisite courses by the start of the internship with a grade of 'C' or better, and have a minimum cumulative and "core" course GPA of 2.50. Application deadline is March 1. Admission into the internship is selective and is based upon successful completion of all internship prerequisites (a minimum of 20 resident credits at NDSU for transfer students), GPA, references, interview, and related experience. In addition, students must comply with criminal background and student conduct requirements. Applications for the internship are available from the Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences>).

Faculty

- Backes, Alyssa, Lecturer, Nursing, B.S.N., 2004, Medcenter One College of Nursing
- Barnacle, Mykell, Assistant Professor of Practice, Nursing, D.N.P., 2008, North Dakota State University
- Berger, Sara, Assistant Professor of Practice, Nursing, M.S.N., 2005, University of Mary
- Biberdorf, Robert, Emeritus Professor, Pharmacy Practice, M.S., 1978, North Dakota State University
- Brooks, Amanda, Assistant Professor, Pharmaceutical Sciences, Ph.D., 2006, University of Wyoming
- Brown, Wendy, Associate Professor, Pharmacy Practice, Pharm.D., 2001, North Dakota State University
- Buettner-Schmidt, Kelly, Associate Professor, Nursing, Ph.D., 2013, University of New Mexico
- Carson, Paul, Professor of Practice, Public Health, M.D., 1986, University of North Dakota
- Cernusca, Dan, Assistant Professor of Practice, Pharmacy Practice, Ph.D., 2007, University of Missouri-Columbia
- Dewey, Mark, Associate Professor of Practice, Pharmacy Practice, Pharm.D., 1999, North Dakota State University
- Eukel, Heidi, Associate Professor of Practice, Pharmacy Practice, Pharm.D., 2008, North Dakota State University
- Eliason, Anne, Assistant Professor of Practice, Nursing, M.S.N., 2010, University of Mary
- Falk, Kara, Assistant Professor of Practice, Nursing, M.S., 2006, University of North Dakota
- Fisher, Amy, Assistant Professor of Practice, Nursing, M.A., 1992, College of St. Catherine
- Fitz, Alicia, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 1996, Creighton University
- Focken, Rebecca, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 2004, North Dakota State University
- Frenzel, Jeanne, Associate Professor, Pharmacy Practice, Pharm.D., 2003, North Dakota State University
- Friesner, Daniel, Professor, Pharmacy Practice; Associate Dean for Student Affairs and Faculty Development, Ph.D., 2000, Washington State University
- Frizzell, Linda, Assistant Professor of Practice, Public Health, Ph.D., 1991, University of North Dakota
- Grandbois, Donna M., Associate Professor, Nursing and Public Health, Ph.D., 2008, North Dakota State University
- Gross, Carla J., Associate Professor of Practice; Associate Dean and Department Chair of Nursing - Fargo, Ph.D., 2011, North Dakota State University
- Gross, Dean, Assistant Professor of Practice, Nursing, D.N.Sc., 1998, Rush University
- Guo, Bin, Associate Professor, Pharmaceutical Sciences, Ph.D., 1999, Roswell Park Cancer Institute, University of New York-Buffalo
- Hanson, Alexis, Assistant Professor of Practice, Nursing, M.N.A., 2010, Wolford College
- Hanson, Melissa, Assistant Professor of Practice, Nursing, M.S.N., 2006, University of Mary
- Harrington, Agnes E., Emeritus Professor, Pharmacy, M.S.Ed., 1969, North Dakota State University
- Haug, Karla, Assistant Professor of Practice, Nursing, M.S., 2005, North Dakota State University
- Heinert, Shelia, Assistant Professor of Practice, Nursing, M.S.N., 2014, University of Mary
- Henderson, William M., Emeritus Professor, Pharmaceutical Sciences, Ph.D., 1967, North Dakota State University
- Heuer, Loretta, Professor, Nursing, Ph.D., 1995, University of North Dakota
- Huseth-Zosel, Andrea, Assistant Professor, Public Health, Ph.D., 2014, North Dakota State University
- Jarajapu, Yagna PR, Assistant Professor, Pharmaceutical Sciences, Ph.D., 2002, Glasgow Caledonian University, UK

- Johnson, Jill, Assistant Professor of Practice, Nursing, M.S.N., 2011, University of Phoenix
- Kelsch, Michael, Associate Professor of Practice, Pharmacy Practice, Pharm.D., 1999, North Dakota State University
- Khalil, Shoukry K.W., Emeritus Professor, Pharmaceutical Sciences, Ph.D., 1960, Cairo University, Egypt
- Kiser-Larson, Norma, Associate Professor, Nursing, Ph.D., 1999, University of Minnesota
- Kopp, Wendy, Associate Professor of Practice, Nursing, M.S.N., 2004, University of Mary
- Kunkel, Charys, Assistant Professor of Practice, Nursing, M.S.N., 2011, University of Mary
- Lantz, Cheryl, Assistant Professor of Practice, Nursing, Ph.D., 2009, University of North Dakota
- Latham, Karen, Associate Professor of Practice, Nursing; Department Chair of NDSU Nursing at Sanford Health, Ph.D., 1992, University of Colorado
- Leclerc, Estelle, Assistant Professor, Pharmaceutical Sciences, Ph.D., 1994, University of Paris XI, France
- Lundeen, Tina, Assistant Professor of Practice, Nursing, D.N.P., 2009, North Dakota State University
- Maack, Brody, Assistant Professor or Practice, Pharmacy Practice, Pharm.D., 2006, North Dakota State University
- Mackowick, Margaret S., Assistant Professor of Practice, Nursing, M.S., 1996, University of North Dakota
- Magarian, Edward O., Emeritus Professor, Pharmacy Practice, Ph.D., 1964, University of Mississippi
- Mallik, Sanku, Professor, Pharmaceutical Sciences, Ph.D., 1991, Case Western Reserve University
- McDaniel, Becky, Assistant Professor of Practice, Nursing, M.S.N., 2001, University of Mary
- Miller, Donald R., Professor, Pharmacy Practice, Department Chair, Pharm.D., 1978, University of Michigan
- Mooney, Mary Margaret, Emeritus Professor, Nursing, D.N.Sc., 1980, Catholic University of America
- Muzzy, Julia, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 2014, Albany College of Pharmacy and Health Science
- Nadeau, Melanie, Assistant Professor of Practice, Public Health, M.P.H., 2010, University of Minnesota
- Narveson, Lisa, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 2003, North Dakota State University
- Naughton, Cynthia, Associate Professor, Pharmacy Practice; Senior Associate Dean, Pharm.D., 1995, North Dakota State University
- Nelson, Sharon, Assistant Professor of Practice, Nursing, Ph.D., 2005, University of North Dakota
- Obritsch, Christie, Assistant Professor of Practice, Nursing, M.S.N., 2005, University of Mary
- Olson, Carla, Assistant Professor of Practice, Nursing, M.S.N., 2004, University of North Dakota
- Olson, Polly M., Senior Lecturer, Allied Sciences, Director, M.S., 1993, University of North Dakota
- O'Rourke, Stephen T., Professor, Pharmaceutical Sciences, Ph.D., 1985, University of Wisconsin
- Ozbun, Judith M., Emeritus Professor, Pharmacy Practice, M.S., 1962, North Dakota State University
- Patterson, Betty, Emeritus Professor, Pharmacy Practice, Ph.D., 1968, University of Iowa
- Peterson, Charles D., Professor, Pharmacy Practice; Dean, College of Pharmacy, Nursing, and Allied Sciences, Pharm.D., 1977, University of Minnesota
- Petry, Natasha, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 2012, North Dakota State University
- Qian, Steven Y., Associate Professor, Pharmaceutical Sciences, Ph.D., 1999, University of Iowa
- Ramstad, Marsha, Lecturer, Nursing, M.S., 2004, North Dakota State University
- Riggins, Janet, Lecturer, Nursing, M.S.N., 2013, Arizona State University
- Rose, Wanda, Associate Professor of Practice, Nursing, Ph.D., 2006, University of North Dakota
- Saarinen, Heidi, Assistant Professor of Practice, Nursing, D.N.P., 2010, North Dakota State University
- Schmitz, Tara, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 1995, North Dakota State University
- Schnell, R. Craig, Professor, Pharmaceutical Sciences, Ph.D., 1969, Purdue University
- Scott, David, Professor, Pharmacy Practice, Ph.D., 1987, University of Minnesota
- Secor-Turner, Molly, Assistant Professor, Nursing, Ph.D., 2008, University of Minnesota
- Shelver, William H., Emeritus Professor, Pharmaceutical Sciences, Ph.D., 1962, University of Virginia
- Singh, Jagdish, Professor, Pharmaceutical Sciences; Department Chair, Ph.D., 1982, Banaras Hindu University, India
- Skoy, Elizabeth, Associate Professor of Practice, Pharmacy Practice, Pharm.D., 2007, North Dakota State University
- Smith, Mary, Assistant Professor of Practice, Nursing, M.S.N., 2002, University of Mary
- Steffen, Kristine, Associate Professor, Pharmaceutical Sciences, Ph. D., 2007, North Dakota State University
- Stenson, Jana, Assistant Professor of Practice, Nursing, M.S., 1995, University of North Dakota
- Strand, Mark, Associate Professor, Pharmacy Practice, Ph.D., 2004, University of Colorado at Denver
- Strom, Patricia, Assistant Professor of Practice, Nursing, M.Ed., 1997, North Dakota State University
- Strommen, Gordon L., Emeritus Professor, Pharmacy Practice, Pharm.D., 1984, University of Nebraska
- Sun, Chengwen, Associate Professor, Pharmaceutical Sciences, Ph.D., 1996, Norman Bethune University of Medical Sciences, China
- Thompson, Shila, Assistant Professor of Practice, Nursing, Ph.D., 2012, South Dakota State University
- Udem, Teri, Lecturer, Pharmacy Practice, B.S., 1992, University of Kansas

- Unterseher, Lindsey, Assistant Professor of Practice, Nursing, M.S.N., 2014, University of North Dakota
- Van Ningen, Heather, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 2001, Drake University
- Vetter, Stefan, Research Assistant Professor of Practice, Pharmaceutical Sciences, Ph.D., 1998, Swiss Federal Institute of Technology, Switzerland
- Warne, Donald, Associate Professor and Chair, Public Health, Mary J. Berg Professorship in Women's Health established by Ordean K. Berg, M.D., 1995, Stanford University School of Medicine
- Werremeyer, Amy, Associate Professor of Practice, Pharmacy Practice, Department Vice Chair, Pharm. D., 2005, North Dakota State University
- Wilhelm, Ross, Assistant Professor of Practice, Pharmacy Practice, Pharm.D., 1998, North Dakota State University
- Wright, Mary, Associate Professor, Nursing, Ph.D., 1988, University of Texas
- Wu, Exi, Assistant Professor, Pharmaceutical Sciences, Ph.D., 1998, Sheffield University Medical School, UK
- Wynn, Cheryl, Assistant Professor of Practice, Nursing, M.S.N., 2011, University of North Dakota

Department of Allied Sciences

Welcome to North Dakota State University's Department of Allied Sciences

The Department of Allied Sciences offers three undergraduate programs that lead to a Bachelor of Science degree: medical laboratory science, radiologic sciences, and respiratory care.

The department's mission is to prepare students with the knowledge, skills, and professional traits necessary to become competent, compassionate, and contributing professionals in their career choice of Medical Laboratory Science, Radiologic Sciences or Respiratory Care. In support of this mission, the department and its affiliated hospital programs offer a curriculum that promotes the development of a graduate who thinks critically and independently, whose behavior is guided by ethical and professional values, and prepares them for lifelong learning and leadership in their profession.

A Bachelor of Science, major in Medical Laboratory Science (MLS), includes three years of academic coursework on campus, followed by an 11-12 month professional level internship in an affiliated hospital's MLS program during which students complete classes and clinical education specific to MLS. 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, major in Radiologic Sciences (RS), includes two or more years of academic coursework on campus and a two year professional level internship in an affiliated hospital's school of radiologic technology where students learn diagnostic radiography principles and practices. Affiliated hospital programs are accredited by the Joint Review Committee for Education in Radiologic Technology (JRCERT). Graduates are eligible to take the American Registry of Radiologic Technologists (ARRT) certifying exam to earn the registered technologist in radiography RT(R) credential.

A Bachelor of Science, major in Respiratory Care (RC), includes two-three years of academic coursework on campus and a 15-month professional level internship at Sanford Health in Fargo, where 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). Upon completion of all degree requirements, 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 a suitable plan of study for successful completion of degree requirements.

Medical Lab Science (p. 350)

Radiologic Sciences (p. 352)

Respiratory Care (p. 354)

Medical Laboratory Science

Medical Laboratory Science Major

Medical laboratory scientists use analytical procedures and the latest biomedical instruments to perform laboratory tests on blood and body fluids that assist physicians in patient diagnosis and treatment, disease monitoring and prevention. Clinical chemistry, hematology, microbiology, urinalysis, immunohematology, and immunology are the principle practice areas for an MLS working in a medical laboratory. In addition to laboratory testing and analysis, an MLS may also monitor test quality, supervise personnel, conduct research and develop new tests and methodologies.

A Bachelor of Science degree, major in Medical Laboratory Science, includes three years of academic coursework on campus followed by an 11-12 month full-time professional class and clinical internship in an affiliated 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 (ASCP BOC).

College academic coursework includes college algebra, biology, microbiology, general and organic chemistry, biochemistry, and statistics, along with general education electives. The full-time professional hospital program consists of classroom and clinical bench instruction in clinical chemistry, hematology, immunohematology, microscopy/urinalysis, microbiology, serology, phlebotomy, education, management, and research methods.

Students who have completed the prerequisite course work on campus and meet the GPA requirements established by the affiliated hospital program may be eligible to apply for the professional-level class and clinical internship. Transfer students must complete a minimum of 20 resident credits at NDSU prior to the start of the professional program to be eligible to apply. NDSU has affiliation agreements with seven hospital-based MLS programs that provide the necessary professional-level education. Affiliated programs are accredited by the National Accrediting Agency for Clinical Laboratory Science (NAACLS). Admission to hospital programs is competitive. Criteria for admission is established by each hospital program and generally includes academic performance at the university level, references, related experience, compliance with essential functions, and an interview. In addition, students must comply with criminal background and student conduct requirements.

During the professional program, specific letter grades are assigned by the hospital program, recorded on the hospital program's official transcript, and are not included in calculation of NDSU's grade point average. Official transcripts are available upon written request from the hospital program. An NDSU grade of 'Pass' is awarded for successful completion of each term of the internship.

Information about the profession, curriculum, internship, and advising contacts are available from the Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences>).

Major Requirements

Medical Laboratory Science Major

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
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CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
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CSCI 114	Microcomputer Packages	3-4
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or CSCI 116	Business Use of Computers	
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		41-42
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Major Requirements

General Education Requirements		40
Medical Laboratory Science Major Requirements		
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 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
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
ZOO 315 & 315L	Genetics and Genetics Laboratory	4
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	
Degree Electives: Potential of 2 credits to reach 122		2
Total Credits		122-123

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.

Radiologic Sciences

Radiologic Sciences Major

Radiographers, also known as radiologic technologists, perform diagnostic imaging examinations to assist physicians to diagnose or rule out disease or injury.

A Bachelor of Science degree, major in Radiologic Sciences (RS), includes two or more years of rigorous academic course work on campus and a two-year full-time professional level internship in an affiliated hospital-based school of radiologic technology that includes classroom and clinical education specific to diagnostic radiography. Graduates are eligible to write the national certifying examination administered by the American Registry of Radiologic Technologists (ARRT) to become a registered technologist in radiography, RT(R).

A strong science and math aptitude is important for RS majors to possess since academic course work includes chemistry, physics, anatomy and physiology, microbiology, trigonometry, and statistics, in addition to general education courses. The full-time two-year professional level internship (60 credits) consists of classroom and clinical instruction in patient care procedures, radiation physics and protection, principles of imaging, positioning, radiobiology, and pathology.

Students who have completed the prerequisite course work on campus and meet the GPA and grade requirements may be eligible to apply for the professional internship. Transfer students must complete a minimum of 20 resident credits at NDSU prior to the start of the professional program to be eligible to apply. NDSU has affiliation agreements with ten hospital-based schools of radiologic technology that are accredited by the Joint Review Committee for Education in Radiologic Technology (JRCERT). Admission into the internship is competitive. Specific admission criteria are established by each affiliated hospital program and generally includes completion of required courses, academic achievement, references, related experience, and an interview. In addition, students must comply with criminal background and conduct requirements.

During the professional internship, specific letter grades are assigned by the hospital program, maintained on their program's official transcript, and are not included in calculation of NDSU's grade point average. Official transcripts are available upon written request from the hospital program. An NDSU grade of 'Pass' is awarded for successful completion of each term of the internship.

Information about the profession, curriculum, internship, and advising contacts are available from the Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences>).

Major Requirements

Radiologic Sciences Major

Degree Type: B.S.

Required Degree Credits to Graduate: 132

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course of Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
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CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
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CSCI 114	Microcomputer Packages	3-4
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or CSCI 116	Business Use of Computers	
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology	3
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Select from current general education list		3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list**Total Credits** 41-42**Major Requirements****General Education Requirements** 40**Radiologic Science Major Requirements**

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:BIOL 221 Human Anatomy and Physiology II 4
& 221L and Human Anatomy and Physiology II LaboratoryCHEM 260 Elements of Biochemistry 3-4
or BIOC 460 Foundations of Biochemistry and Molecular Biology I

MATH 105 Trigonometry (or higher level) 3

Select one microbiology course and lab from the following: 3-5

MICR 202 Introductory Microbiology
& 202L and Introductory Microbiology LabMICR 350 General Microbiology
& 350L and General Microbiology Lab

PHRM 125 Medical Terminology for Health Professionals 1

PHRM 170 Common Medicines & Diseases 2-3
or PHRM 300 Principles of Clinical PharmacologyPHYS 211 College Physics I 4
& 211L and College Physics I LaboratoryPHYS 212 College Physics II 4
& 212L and College Physics II Laboratory**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

Total Credits 132-136**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.

Respiratory Care**Respiratory Care Major**

Respiratory Care (RC) is an allied health profession that involves the evaluation, treatment, and education of patients with cardiopulmonary (heart-lung) disorders. Respiratory therapists (RTs) work closely with physicians, nurses, and other allied health members in critical care, emergency rooms, newborn nurseries and pediatrics, medical units, and home care. RTs perform diagnostic tests that assist a physician to diagnose and monitor lung

disease, administer a variety of treatments to alleviate breathing problems, manage mechanical ventilators and life support equipment, direct pulmonary rehabilitation activities, and educate patients and their families about their disease process, therapy and wellness.

A Bachelor of Science degree, Respiratory Care major, includes two to three years of academic course work on campus and a 15-month professional level internship in the Respiratory Care Department at Sanford Medical Center, Fargo, N.D. where students' 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. RC graduates are eligible to write the national certifying examinations leading to the registered respiratory therapist (RRT) credential.

Academic course work includes chemistry, physics, anatomy and physiology, microbiology, college algebra, psychology, and computer science, in addition to general education courses. The full-time professional internship at Sanford consists of lecture, laboratory, and clinical education that prepares the student to enter the profession of respiratory care. Near the end of the professional program, students choose a specialty area of practice for a focused clinical experience. Common specialties include neonatal/pediatric general or intensive care, adult general or intensive care, diagnostics, pulmonary rehabilitation, home care, education, and management (RC 494 Individual Study).

Qualified students apply for the professional internship during the spring of the academic year they plan to complete all prerequisite courses. The application deadline is March 1 annually. Admission is selective and based upon successful completion of all prerequisite courses with a minimum grade of 'C' (a minimum of 20 resident credits at NDSU for transfer students), cumulative and "core" course grade point average (a minimum of 2.50 is required; a maximum of core course attempts is two), references, personal interview, and related experience. In addition, students must comply with criminal background and student conduct requirements.

Information about the profession, curriculum, internship, and advising contacts are available from the Department of Allied Sciences (<https://www.ndsu.edu/alliedsciences>).

Major Requirements

Respiratory Care Major

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal	
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
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CSCI 114	Microcomputer Packages	3-4
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or CSCI 116	Business Use of Computers	
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PHYS 120	Fundamentals of Physics	3
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology	3
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Select from current general education list		3
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Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	40-41

Major Requirements

General Education Requirements	40
Respiratory Care Major Requirements	
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:	
BIOL 221 Human Anatomy and Physiology II & 221L and Human Anatomy and Physiology II Laboratory	4
CHEM 121 General Chemistry I & 121L and General Chemistry I Laboratory	4
CHEM 122 General Chemistry II & 122L and General Chemistry II Laboratory	4
CHEM 240 Survey of Organic Chemistry	3
CHEM 260 Elements of Biochemistry or BIOC 460 Foundations of Biochemistry and Molecular Biology I	3-4
HNES 210 Professional Rescuer CPR/AED and First Aid	1
MATH 103 College Algebra (or higher level; excluding MATH 104)	3
Select one MICR course & lab from the following:	3-5
MICR 202 Introductory Microbiology & 202L and Introductory Microbiology Lab	
MICR 350 General Microbiology & 350L and General Microbiology Lab	
PHRM 125 Medical Terminology for Health Professionals	1
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	
Total Credits	128-131

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.
- Core courses have a maximum of two attempts allowed. These include:

BIOL 220 Human Anatomy and Physiology I & 220L and Human Anatomy and Physiology I Laboratory	4
PHYS 120 Fundamentals of Physics	3

BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology 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
CHEM 240	Survey of Organic Chemistry	3
CHEM 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	4
MATH 103	College Algebra	3
One MICR 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	
PHRM 125	Medical Terminology for Health Professionals	1

School of Nursing

www.ndsu.edu/nursing

Nursing Major

The NDSU BSN Nursing program is offered at two locations: The NDSU Fargo campus 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 campus, department offices, faculty offices, and classrooms are located in a building north of Sanford Health.

The Nursing program is a four-year course of study leading to a Bachelor of Science in Nursing (BSN) degree. Upon successful completion of the program, the graduate is eligible to apply for licensure as a registered nurse (RN). The Nursing program is approved by the North Dakota Board of Nursing and is nationally accredited by the Commission on Collegiate Nursing Education (CCNE).

Mission

The mission of the Nursing Department is to provide professional nursing education, to advance knowledge of the discipline, and to serve as a resource for the health care needs of society.

Core Values

The faculty, students, and graduates of the Department of Nursing believe in the inherent worth and dignity of individuals and the value of professional nursing as an integral part of the health of society. We believe the core values of autonomy, caring, integrity, justice, professionalism, and respect guide the scholarship of education, service, practice and research.

The role of faculty is to encourage, facilitate, and provide opportunities which support self-directed learning and critical thinking, enhance personal growth and socialize students as members of the profession. The role of students is to develop the knowledge, skills and attitudes essential to professional nursing practice and graduate study in nursing. The role of the graduates is to promote the health of society, advance the discipline, and function as responsible citizens of the nation and the world.

Nursing is an art and science. It is a practice profession and an academic discipline. The domain of nursing is the human response to actual or potential variations in human functioning and life processes. Nursing involves interactions among the nurse, the person and the environment in the prevention of disease, the promotion and restoration of health, and the comfort of the dying.

Professional nursing practice is the creative application of therapeutic nursing interventions based on a synthesis of scientific knowledge, research, professional values and standards. Professional nurses work with individuals, families, communities and other aggregates to meet primary, secondary, and tertiary health care needs. Nurses practice independently, interdependently, and collaboratively in a variety of settings. Nurses balance career advancement, personal well-being, and fidelity to nursing's social contract.

Core values provide a framework that supports education for and practice of professional nursing as envisioned by the Department of Nursing.

Caring is the central concept of nursing. The competence, sensitivity, and compassion that characterize professional caring guide our behavior in faculty/student and nurse/client interactions. Respect is reflected by nurses' regard for human dignity and in our acceptance of the diversity of humankind. In our practice we demonstrate our respect for other disciplines through collegiality and collaboration.

Autonomy reflects a patient's right to make decisions about his/her health care and nurses' rights to make decisions about their professional practice. Integrity is manifested in our honesty with patients and the public, by adherence to standards of academic honesty, through our accountability for our actions, and through our provision of care based on practice standards.

The professional obligation to assure equal treatment and equal access to care is a facet of justice. Nurses have a professional responsibility to encourage legislation and policy development that advances nursing care and quality health care for all people. Nursing faculty has an obligation to ensure that students have the opportunity to participate in and contribute to an excellent learning environment. Professionalism encompasses a commitment to lifelong learning and professional development, participation in professional organizations and the political process, and adherence to professional values and regulations.

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, 2004) 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.

Nursing (p. 358)

Nursing

Major Requirements

Major: Nursing - Pre-Licensure Track

Degree Type: B.S.N.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

NURS 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Division Writing. Select one of the following:		3
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ENGL 324	Writing in the Sciences
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ENGL 325	Writing in the Health Professions
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ENGL 358	Writing in the Humanities and Social Sciences
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COMM 110	Fundamentals of Public Speaking *	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab *	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	3
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3
or ANTH 111	Introduction to Anthropology	
Wellness (W):		
HNES 250	Nutrition Science	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		42

Major Requirements

All students must complete all required courses with a grade of 'C' or better.

General Education Requirements		40
Nursing Major Requirements		
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
CHEM 260	Elements of Biochemistry *	4
PSYC 250	Developmental Psychology	3
or HDFS 230	Life Span Development	
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 341	Foundations of Clinical Nursing	3
NURS 342	Adult Health Nursing I	5
NURS 352	Family Nursing I	5
NURS 360	Health Assessment	4
NURS 362	Family Nursing II	4
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
PHRM 300	Principles of Clinical Pharmacology	3
PNAS 400	Interprofessional Health Care Practice	3
Degree Electives: Potential of 8 credits to reach 122		8
Total Credits		122

* 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.

Degree Requirements and Notes

- Students must maintain a semester GPA of 2.0 or above for each semester in the College of Pharmacy, Nursing, and Allied Sciences (CoPNAS). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoPNAS.
- 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 - Associate to BSN Track

Degree Type: B.S.N.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

NURS 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II *	3
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One Course in Upper Level Writing. Select one of the following:		3
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ENGL 320	Business and Professional Writing	
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ENGL 321	Writing in the Technical Professions	
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ENGL 322	Writing and the Creative Process	
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ENGL 323	Creative Writing	
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ENGL 324	Writing in the Sciences	
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ENGL 325	Writing in the Health Professions	
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ENGL 358	Writing in the Humanities and Social Sciences	
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ENGL 459	Researching and Writing Grants and Proposal *	
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COMM 110	Fundamentals of Public Speaking *	3
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Quantitative Reasoning (R): Select from current general education list.		3
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Science & Technology (S):

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
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CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab *	4
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MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab *	3
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Humanities & Fine Arts (A): Select from current general education list.		6
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Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology *	3
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SOC 110	Introduction to Sociology *	3
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or ANTH 111	Introduction to Anthropology	
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Wellness (W):

HNES 250	Nutrition Science	3
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Cultural Diversity (D): Select from current general education list.

Global Perspectives (G): Select from current general education list.		
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Total Credits		42
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Major Requirements

All students must complete all required courses with a grade of 'C' or better.

General Education Requirements	40
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Nursing Major Requirements	
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BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory *	4
CHEM 260	Elements of Biochemistry	4
PSYC 250 or HDFS 230	Developmental Psychology * Life Span Development	3
NURS 210	Orientation to Research and Evidence-Based Practice	2
NURS 251	Skills and Concepts for Nursing	2
NURS 252	Gerontologic Nursing	2
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 (valid)	5
NURS 360	Health Assessment	4
NURS 362	Family Nursing II (valid)	4
NURS 372	Integrated Family Nursing	3
NURS 402	Mental Health Nursing (valid)	4
NURS 403	Adult Health Nursing II (valid)	5
NURS 405	Psychosocial Nursing	2
NURS 406	Community & Public Health Nursing	4
NURS 407	Adult Health: Complex Problems	3
NURS 407L	Adult Health: Complex Problems Clinical	2
NURS 410	Research and Redesign	2
NURS 450	Nursing Synthesis/Practicum	4
NURS 460	Management, Leadership and Career Development	3
PNAS 400	Interprofessional Health Care Practice	3
PHRM 300	Principles of Clinical Pharmacology	3
Degree Electives: Potential of 3 credits to reach 122		3
Total Credits		123

* 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 Pharmacy, Nursing, and Allied Sciences (CoPNAS). A student who fails to meet this standard for two successive or three non-successive semesters may be terminated from enrollment in the CoPNAS.
- 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.

School of Pharmacy

www.ndsu.edu/pharmacy

The professional pharmacy program is a joint effort of the Department of Pharmacy Practice and the Department of Pharmaceutical Sciences under the School of Pharmacy within the College of Health Professions. See Programs of Study for further information.

Pharmacy Practice

Vision

The Department of Pharmacy Practice continually improves patient and population health through student and practitioner education by integrating emerging models of teaching, scholarship, clinical practice and service.

Mission

The mission of the Department of Pharmacy Practice is to educate students and practitioners, advance research/scholarship, deliver quality patient care, and provide service to the profession.

We will accomplish this by:

- Developing students and graduates who are sought after as competent healthcare professionals.
- Providing a relevant, practical and integrated curriculum that has measurable ability-based outcomes.
- Promoting interprofessional opportunities within the state and region.
- Providing quality and diversified, introductory and advanced pharmacy practice experiences.
- Securing financial, physical, and human resources to engage in effective teaching, research, practice, and service.
- Providing an environment that positively impacts the recruitment, retention, engagement, and promotion of faculty/staff.
- Expanding distance and continuing education capabilities.
- Promoting collaboration in and among the Department, College, and University to enhance research and scholarship.
- Supporting the role of the pharmacist in rural and public health.
- Supporting post-graduate education in the form of residencies and a Master of Public Health degree.

Pharmaceutical Sciences

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 30 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.

Indicators that we are moving toward our Vision:

- Ranking among the top 30 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.

Pharmacy Doctorate (Pharm.D.) Program (p. 362)

Pharmacy Doctorate (Pharm.D.) Program

The Pharmacy program encompasses both the basic and clinical sciences and is designed to provide students with the knowledge, skills, and attitudes essential to the practice of pharmacy. Pharmacists work in concert with the patient and other health care providers to promote health and prevent diseases. This is achieved by assessing, monitoring, initiating and modifying patients' medication therapy to achieve optimal therapeutic outcomes.

The pharmacy curriculum consists of a four year professional program leading to the Pharm.D. degree. Students enter the program in pre-pharmacy upon meeting general admission standards of the university and must satisfy all required pre-pharmacy coursework prior to beginning the professional program. Students are admitted to the final four professional years on a competitive basis, and must meet specific admission requirements of the

college. The program leads to a Doctor of Pharmacy degree (Pharm.D.). For admission requirements to the professional program, contact the Dean's Office of the college. Students attending other institutions must maintain frequent contact with the college to determine appropriate course work. The pre-pharmacy course work may be completed at other institutions if course work has been submitted for formal NDSU review and determined to be equivalent to NDSU requirements.

The current entry-level Pharm.D. curriculum is designed to produce graduates with the professional competencies necessary to enter pharmacy practice in any setting to ensure optimal medication therapy outcomes and patient safety, and to satisfy the educational requirements for licensure as a pharmacist. The Pharm.D. degree prepares the student to accept positions in community, hospital, managed care, clinical, and industrial pharmacy. Other potential opportunities include administrative positions in pharmaceutical companies and associations. Teaching and research positions in universities and the pharmaceutical industry are excellent opportunities for those with advanced training in pharmacy.

The college is a member of the American Association of Colleges of Pharmacy, and is accredited by the Accreditation Council for Pharmacy Education (ACPE).

Major: Pharmaceutical Sciences (includes the requirements for the pre-pharmacy program)

Degree Type: B.S.

Required Degree Credits to Graduate: 122+

General Education Requirements

First Year Experience (F):

ABEN 189/AGRI 189/BUSN 189/HD&E 189/ME 189/NURS 189/PHRM 189/UNIV 189: Skills for Academic Success	1
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Communication (C):

COMM 110	Fundamentals of Public Speaking *	3
ENGL 110	College Composition I	3
ENGL 120	College Composition II *	3
Upper Level Writing		3

Quantitative Reasoning (R): See Pre-Pharmacy Requirements	3
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Science & Technology (S): See Pre-Pharmacy Requirements	10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): See Pre-Pharmacy Requirements	6
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Wellness (W): Select from current general education list	2
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Total Credits	40
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Pharmaceutical Sciences Major Requirements

(Includes the requirements for the pre-pharmacy and credit from the P1 & P2 professional program)

General Education Requirements	40
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Pre-Pharmacy Requirements

BIOC 460	Foundations of Biochemistry and Molecular Biology I *	3
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
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 (both courses can be used in GE category S) *	4
BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory (both courses can be used in GE category S)	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory (both courses can be used in GE category S)	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory (both courses can be used in GE category S)	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory *	4
CHEM 342	Organic Chemistry II *	3
COMM 216	Intercultural Communication (can be used a GE category B)	3
ENGL 324 or ENGL 325	Writing in the Sciences (either course can be used in GE category C for UDW) or Writing in the Health Professions	3
ECON 201	Principles of Microeconomics (can be used as GE category B)	3

MATH 146	Applied Calculus I (can be used for GE category R)	4
MICR 202 & 202L or MICR 350 & 350L	Introductory Microbiology and Introductory Microbiology Lab (all courses can be used in GE category S) *	3-5
MICR 460	Pathogenic Microbiology	3
PHYS 211	College Physics I	3
STAT 330	Introductory Statistics (can be used for GE category R) *	3
Professional Pharmacy P1 & P2 Years		69
Total Credits		145-147

* 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 December 31 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 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 PNAS.

NOTE: Student admitted to the Pharm.D. program will earn a Bachelor of Science Degree with a major in Pharmaceutical Science with successful completion of all courses through the second year of the professional Pharm.D. program.

Major Requirements

Major: Doctor of Pharmacy

Degree Type: Pharm.D.

Required Degree Credits to Graduate: 142

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 department and any changes that occur while in the professional program will be communicated to the student by the department.

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	Pharmaceutics III: Pharmacokinetics	3
PHRM 340	Pathophysiology I	4
PHRM 341	Pathophysiology II	4
PHRM 350	Introduction to Pharmacy Practice	2
PHRM 351L	Pharmaceutical Care Laboratory I	2
PHRM 352	Introduction to Health Care Systems	2

P2 Second Year Professional

PSCI 413	Endocrine/Respiratory/GI Pharmacodynamics	3
PSCI 414	Cardiovascular Pharmacodynamics	3
PSCI 415	Neuropsychiatry Pharmacodynamics	3

PSCI 417	Pharmacogenomics	2
PHRM 450	Self Care	3
PHRM 452L	Pharmaceutical Care Laboratory II	2
PHRM 480	Drug Literature Evaluation	3
PHRM 532	Infectious Disease	3
PHRM 534	Rheumatology/Endocrinology/Gastrointestinal	3
PHRM 535	PTDI:Neoplastic Diseases	3
PHRM 538	PTDI: Cardiovascular and Pulmonary Diseases	4
PNAS 400	Interprofessional Health Care Practice	3
P3 Third Year Professional		
PHRM 475	Pharmacy Practice Management	3
PHRM 520	Special Populations	3
PHRM 536	Neurology & Psychiatry	3
PHRM 537	Renal Disease/Fluid and Electrolytes	3
PHRM 540	Public Health for Pharmacists	3
PHRM 551L	Pharmaceutical Care Laboratory III	2
PHRM 552L	Pharmaceutical Care Laboratory IV/Introductory Pharmacy Practice Experience IV	2
PHRM 555	Introductory Pharmacy Practice Experience III	1
PHRM 560	Specialty Care Topics	2
PHRM 570	Pharmacy Practice Improvement and Project Management	3
PHRM 572	Pharmacy Law	2
PHRM 580	Pharmacotherapy Capstone	3
P4 Fourth Year Professional		
PHRM 581	Advanced Pharmacy Practice Experience I	10
PHRM 582	Advanced Pharmacy Practice Experience II	15
PHRM 583	Advanced Pharmacy Practice Experience III	15
Total Credits		139

- To apply to the professional entry-level pharmacy program at NDSU, an application must be submitted on-line to the Dean's Office, Sudro 123, by December 31. A cumulative grade point average of 3.0 or above is required before an applicant will be evaluated. Online application should be available the first week of November.
- The deadline to apply to the pharmacy program is December 31, 2015.
- 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 2015 for students applying for 2016. We will accept PCAT scores from exams taken back three years (July 2012 to November 2015). If you are interested in taking a practice test, Test Prep Review is a free service of a nonprofit group of educators. Their website was created to provide free practice test questions for students in a variety of career situations. Their PCAT practice test, is located at PCAT Practice (http://www.testprepreview.com/pcat_practice.htm)
- 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, contact the Office of Admissions at 701-231-8643. For International students, contact the Office of International Programs at 701-231-7895.

College of Human Development & Education

Margaret Fitzgerald, Interim Dean

E. Morrow Lebedeff Hall 255, 701-231-8211, www.ndsu.edu/hde

The College of Human Development and Education was established in July 1992. There are five units in the college. Four of these—Apparel, 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 fifth—Center for 4-H Youth Development—offers Extension youth programming across 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 recreation.

Mission

The mission of the College of Human Development 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 Couple and Family Therapy program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education. The Athletic Training program is certified by the Commission on Accreditation of Athletic Training Education. Education programs are accredited by the National Council for Accreditation of Teacher Education and approved by the North Dakota Education and Standards and Practices Board.

The School Counseling, Community Counseling, and Counselor Education and Supervision programs are accredited by the Council for the Accreditation of Counseling and Related Educational Programs. The Dietetics program is accredited by the American Dietetic Association Council of Accreditation. The Interior Design program is accredited by the Council for Interior Design Accreditation.

The Exercise Science Program is endorsed by the Commission of Accreditation of Allied Health Education programs: 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.

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, Sport Pedagogy and Leadership, 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 (M.A.Trng.) may be earned through Health, Nutrition and Exercise Science. Doctoral programs also are offered by the college in Counselor Education and Supervision, Couple and Family Therapy, 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 two tracks: Institutional Analysis and Occupational and Adult Education. 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. 573) online.

The College of HD&E offers six 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, and Dietetics. 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. 44) 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
 - Dietician Education Program
- Exercise Science

- Athletic Training (5-year program)
- Hospitality and Tourism Management
- Human Development and Family Science
 - Adult Development and Aging Option
 - Child Development Option
 - Family Science Option
- Human Development and Family Science/Elementary Education (dual degree/program with Valley City State University (<http://www.vcsu.edu>))*
- Human Development and Family Science/Social Work (dual degree/program with Minot State University (<https://www.minotstateu.edu>))**
- Interior Design
- Sport Management

Secondary Education:

- Agricultural
- Art
- Biological Sciences
- Chemistry
- Comprehensive Science
- Earth Science
- English
 - Communication Option
- Family and Consumer Sciences
- French
- Health
 - School Health Option
- History
- Mathematics
- Physical Education (K-12)
- Physics
- Social Science
- Spanish

* 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 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 Development 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.

** 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 Development 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.

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 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

- Wellness

Undergraduate Certifications

- Certified Family Life Education (CFLE)
- Coaching
- First Aid/CPR
- Food Sanitation
- Physical Best

Interdisciplinary Programs

The College of Human Development and Education participates in two interdisciplinary programs on campus:

Gerontology Minor

The Gerontology minor provides students with an integrated understanding of the process of aging, aging services, and the aged in America. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Women and Gender Studies Major and Minor

The goals of Women and Gender Studies is to examine the contributions of all genders to aspects of society, to explore the intersections of race, class, sexual orientation, age, and physical ability with gender both globally and nationally, to investigate the heritage, challenges and concerns of women and men, and to provide a newer and broader understanding of women and men in all fields. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

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)
- Association of Couple and Family Therapy Students
- 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)
- HDE Leadership Council
- Hospitality Student Association (HSA)
- Human Development and Family Science Club
- Phi Upsilon Omicron (honorary)
- Social Work Organization (SWO)
- Sport Management Association (SMA)
- Student Association of Nutrition and Dietetics (SAND)
- Student North Dakota Education Association (SNDEA)

Additional information is available in the Dean's Office of the college.

HDE Leadership Council

The HDE Leadership Council acts as a liaison organization between the student body, the faculty, and the Dean of the College of Human Development and Education. The council assists in the promotion of the college. Students supplement and complement the existing advisory system and assist in the HD&E 189 Skills for Academic Success course. Student selection is based on academics and a willingness to participate. Student members represent all units in the college. Applications for leadership council are reviewed each fall. Information is available in the Dean's Office (https://www.ndsu.edu/hde/deans_welcome) of the college (255 EML).

Cooperative Education

Cooperative Education (<https://www.ndsu.edu/career/internshipprogram>), 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.

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. 45) section within the Academic Degree Information (p. 44) page of this Bulletin.

Interdisciplinary Programs

The following programs are College of Human Development and Education programs of study:

Gerontology (p. 430)

Wellness (p. 455)

The following program is interdisciplinary and is integrated with one or more college/departments within the University

Great Plains Institute of Food Safety (p. 427)

Faculty

- Aakre, Dean E., Extension Specialist, M.Ed., 1998, North Dakota State University
- Anderson, Earl A., Emeritus Professor of Education, Ed.D., 1962, Washington State University
- Anderson, Sharon D., Emeritus Professor of Human Development and Education, Ph.D., 1994, University of North Dakota
- Asperin, Amelia Estepa, Associate Professor of Apparel, Design, and Hospitality Management, Ph.D., 2007, Kansas State University
- Ayebo, Abraham, Assistant Professor of Mathematics and Education, Ph.D., 2010, University of Nevada-Reno
- Bach, Annette S., Emeritus Professor of Extension, M.S., 1972, University of Southern California
- Baggett, Ashley, Assistant Professor of History, Philosophy, and Religious Studies and School of Education, Ph.D., 2014, Louisiana State University
- Barnhart, Thomas C., Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1978, University of New Mexico
- Bastow-Shoop, Holly E., Professor of Apparel, Design, and Hospitality Management; Department Head, Ph.D., 1981, Oklahoma State University
- Beck, Patricia L., Emeritus Professor of Extension, M.S., 1965, Colorado State University
- Benson, Kristen E., Associate Professor of Human Development and Family Science, Ph.D., 2009, Virginia Polytechnic Institute and State University
- Berglund, Patricia, Emeritus Professor of 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 of Human Development and Family Science, Ph.D., 2008, University of Notre Dame
- Borgen, Vernon A., Adjunct Professor of Health, Nutrition and Exercise Sciences, B.S., 1979, North Dakota State University
- Bormann, Brock, Lecturer of Health, Nutrition and Exercise Sciences, M.A., 2014, Minnesota State University, Mankato
- Borr, Mari, Associate Professor of Education, Ph.D., 2005, University of North Dakota
- Bowen, Bradley, Assistant Professor of Education/Construction Management and Engineering, Ed.D., 2011, North Carolina State University, Raleigh
- Braaten, Ann W., Assistant Professor of Practice of Apparel, Design, and Hospitality Management, Ph.D., 2005, University of Minnesota
- Brotherson, Sean, Extension Specialist and Professor of Human Development and Family Science, Ph.D., 1999, Oregon State University
- Brunt, Ardith R., Associate Professor of 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 of Health, Nutrition and Exercise Sciences, M.S., 1968, North Dakota State University
- Byun, Wonwoo, Assistant Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2012, University of South Carolina

- Carlson, Thomas Stone, Professor of Human Development and Family Science, Ph.D., 2000, Iowa State University
- Christensen, Bryan K., Associate Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2000, University of Kansas
- Christensen, Warren M., Assistant Professor of Physics and Education, Ph.D., 2007, Iowa State University
- Clapper, Ann, Associate Professor of Practice of Education, Ed.D., 1991, Drake University
- Cogdill, Bradley D., Chair, Center for 4-H Youth Development; M.S., 2005, North Dakota State University
- David, Shannon, Assistant Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2013, Ohio University
- Deal, James, Professor of Human Development and Family Science; Ph.D., 1987, University of Georgia
- Deutsch, Michael Joseph, Jr., Associate Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2007, North Dakota State University
- Dittman, Jennette K., Emeritus Professor of Education, Ph.D., 1974, Pennsylvania State University
- Dobry, Alberta M., Emeritus Professor of Education, Ph.D., 1973, Michigan State University
- Douglas, Mary, Assistant Professor of Practice of Health, Nutrition and Exercise Sciences, Ph.D., 2009, Michigan State University
- Duffield, Stacy K., Associate Professor of School of Education, Ph.D., 2003, University of North Dakota
- Eighthmy, Myron, Professor of School of Education, Ed.D., 1995, University of Minnesota
- Erhardt, Marvin J., Adjunct Assistant Professor of Education, Ed.D., 1994, University of Wyoming
- Fitzgerald, Margaret A., Professor of Human Development and Family Science, Head, Health, Nutrition, and Exercise Sciences, Ph.D., 1997, Iowa State University
- Fragodt, Alvin L., Emeritus Professor of Extension, M.S., 1974, North Dakota State University
- Fuller, Heather R., Assistant Professor of Human Development and Family Science, Ph.D., 2009, University of Michigan
- Gange, Kara, Assistant Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2010, North Dakota State University
- Garden-Robinson, Julie A., Extension Specialist and Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1994, North Dakota State University
- Gebeke, Debra, Assistant Director, Family and Consumer Sciences Extension, Ph.D., 1996, University of North Dakota
- German, Nicole, Assistant Professor of Practice of Health, Nutrition, and Exercise Sciences, Ph.D., 2008, North Dakota State University
- Gress, Nancy M., Director, Student Services and Advancement, M.S., 1976, North Dakota State University
- Greterman, Sarah Hilgers, Lecturer of Health, Nutrition, and Exercise Science, M.S., 2010, North Dakota State University
- Gulbrandson, Ruth, Emeritus Professor of Extension, M.S., 1973, North Dakota State University
- Hackney, Kyle, Assistant Professor of Health, Nutrition, and Exercise Sciences, Ph.D., 2013, Syracuse University
- Hahne, Kristen A., Lecturer of Health, Nutrition, and Exercise Sciences, M.S., 2008, North Dakota State University
- Hall, Brenda S., Professor of Education, Ed.D., 1993, Virginia Polytechnic Institute and State University
- Hall, Thomas, Associate Professor of Education, Ed.D., 2005, University of South Dakota
- Hamre, Kellie, Senior Lecturer of Apparel, Design and Hospitality Management, M.S., 2013, Colorado State University
- Hanson, Alan, Lecturer of Education, M.S., 1984, St. Cloud State University
- Hauge, Linda, Extension Specialist, Center for 4-H Youth Development, M.E., 2004, Leslie University
- Hauser, Fredric J., Emeritus Professor of Extension, M.S., 1967, North Dakota State University
- Hektner, Joel, Associate Professor of Human Development and Family Sciences, Interim Head, Ph.D., 1996, University of Chicago
- Hill, Brent, Assistant Professor of Education, Ph.D., 2011, Oklahoma State University
- Hilliard, Elizabeth, Assistant Professor of Practice of Health, Nutrition, and Exercise Sciences, M.S., 2009, East Carolina University
- Hoffman, Jeanette, Assistant Professor of Practice of Education, Ed.D., 2006, University of St. Thomas
- Holbrook, Sandra, Adjunct Professor of Education, Ph.D., 1984, University of Minnesota
- Holm, Edna T., Emeritus Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1987, University of Minnesota
- Hong, Miyoung, Assistant Professor of Apparel, Design and Hospitality Management, M.S., 2006, Oklahoma State University
- Horejsi, Roman J., Emeritus Professor of Health, Nutrition and Exercise Sciences, Ed.D., 1991, University of North Dakota
- Jo, WooMi, Associate Professor of Apparel, Design and Hospitality Management, Ph.D., 2008, Kansas State University
- Johnson, Virginia Clark, Professor of Human Development and Family Science; Dean, College of Human Development and Education, Ph.D., 1984, Pennsylvania State University
- Kaler, Nancy J., Senior Lecturer of Human Development and Family Science, M.S., 1981, University of North Dakota
- Kapplinger, Eunice, Associate Professor of Practice of Apparel, Design, and Hospitality Management, M.S., 1988, Minnesota State University
- Kelter, Paul B., Director, Center for Science and Math Education and Professor of School of Education, Ph.D., 1980, University of Nebraska-Lincoln
- Korcuska, James S., Associate Professor of Education, Ph.D., 2000, Kent State University
- Kryjevskaja, Mila, Assistant Professor of Physics and Education, Ph.D., 2008, University of Washington
- Lajimodiere, Denise, Assistant Professor of Practice of Education, Ed.D., 2006, University of North Dakota
- Larson, Mary F., Assistant Professor of Health, Nutrition, and Exercise Sciences, Ph.D., 2008, University of North Dakota

- Lee, Jaeha, Associate Professor of Apparel, Design and Hospitality Management, Ph.D., 2008, University of Minnesota
- Lewis, Todd, Associate Professor of Education, Ph.D., 2002, Kent State University
- Light, Harriett E., Emeritus Professor of Human Development and Family Science, Ph.D., 1976, Michigan State University
- Linker, Jenny, Assistant Professor of Health, Nutrition, and Exercise Sciences and Education, Ph.D., 2011, University of Illinois
- Lyman, Katie, Assistant Professor of Health, Nutrition, and Exercise Sciences, Ph.D., 2014, University of South Florida
- Manikowske, Linda J., Associate Professor of Apparel, Design, and Hospitality Management, Ph.D., 1993, Iowa State University
- Martin, William O., Professor of Education and Mathematics; Department Head, Ph.D., 1993, University of Wisconsin-Madison
- Martindale, Thomas, Emeritus Professor of Extension, M.S., 1967, University of North Dakota
- Marx, Adam A., Assistant Professor of Education, Ph.D., 2014, The University of Missouri
- Maughan, Arthur W., Emeritus Professor of Health, Nutrition and Exercise Sciences, M.S., 1966, North Dakota State University
- McAllister, Shirley E. Friend, Emeritus Professor of Apparel, Design, and Hospitality Management, Ed.D., 1960, University of Arkansas
- McGeorge, Christine R., Professor of Human Development and Family Science, Ph.D., 2005, University of Minnesota
- Montplaisir, Lisa, Associate Professor of Biological Sciences and Education, Ph.D., 2003, University of Arizona
- Napoleon, Larry II, Assistant Professor of Education, Ph.D., 2009, Pennsylvania State University-University Park
- Narum, Gary A., Emeritus Associate Professor of Education, Ed.D., 1969, University of Wyoming
- Nass, Marillyn, Emeritus Professor of Health, Nutrition and Exercise Sciences, M.S., 1955, Pennsylvania State University
- Nelson, Jill, Associate Professor of Education, Associate Dean, College of Human Development and Education, Ph.D., 2005, Kent State University
- Ness, Megan, Extension Specialist and Coordinator, EFNEP, M.S., 2007, Colorado State University
- Nielsen, Robert C., Emeritus Professor of Education, Ed.D., 1973, University of Northern Colorado
- North, Barbara B., Emeritus Professor of Health, Nutrition and Exercise Sciences, M.S., 1959, University of Minnesota
- Nyachwaya, James, Assistant Professor of Education and Chemistry, Ph.D., 2012, University of Minnesota, Minneapolis
- O'Connor, Melissa, Assistant Professor of Human Development and Family Science, Ph.D., 2010, University of South Florida
- Offerdahl, Erika G., Assistant Professor of Chemistry and Molecular Biology and Education, Ph.D., 2008, University of Arizona
- Overton, Kimberly A., Associate Professor of Practice of Education, Ph.D., 2008, North Dakota State University
- Pankow, Debra L., Associate Professor Emeritus and Extension Specialist of Human Development and Family Science, Ph.D., 2002, South Dakota State University
- Park, Jeongdo, Assistant Professor of Apparel, Design, and Hospitality Management, Ph.D., 2014, Washington State University
- Park, Kwangsoo, Assistant Professor of Apparel, Design, and Hospitality Management, Ph.D., 2013, Temple State University
- Pavek, F. Leslie, Emeritus Professor of Education, Ed.D., 1968, University of North Dakota
- Peterson, Claudette, Assistant Professor of Education, Ed.D., 2006, Oklahoma State University
- Philbrick, Candace, Senior Lecturer of Human Development and Family Science, Ph.D., 2008, North Dakota State University
- Ragan, Ann, Senior Lecturer, Apparel, Design, and Hospitality Management, M.S., 2013, University of Nebraska-Lincoln
- Randall, Brandy A., Associate Professor of Human Development and Family Science, Ph.D., 2002, University of Nebraska-Lincoln
- Ray, Chris M, Assistant Professor of Education, Ph.D., 2007, Oklahoma State University
- Ray-Degges, Susan, Associate Professor of Apparel, Design, and Hospitality Management, Ph.D., 1995, University of Missouri-Columbia
- Rhee, Yeong S., Associate Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1999, Oklahoma State University
- Robinson, Rebecca, Lecturer of Apparel, Design, and Hospitality Management, M.D., 2003, University of Cincinnati
- Roumell, Elizabeth A., Assistant Professor of Education, Ph.D., 2009, University of Wyoming
- Salajan, Florin D., Assistant Professor of Education, Ed.D., 2007, Columbia University
- Sanders, Gregory F., Professor of Human Development and Family Science; Associate Dean, College of Human Development and Education, Ph.D., 1983, University of Georgia
- Sassi, Kelly, Associate Professor of English and Education, Ph.D., 2008, University of Michigan
- Scoby, Donald R., Emeritus Professor of Botany/Biology and Education, Ph.D., 1968, North Dakota State University
- Shume, Teresa, Assistant Professor, Ph.D., 2013, University of North Dakota
- Stastny, Sherri N., Associate Professor of Health, Nutrition and Exercise Sciences, Ph.D., 2007, North Dakota State University
- Strand, Bradford N., Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1988, University of New Mexico
- Strommen, Jane, Assistant Professor of Practice of Human Development and Family Sciences, M.S., College of St. Francis
- Sunderlin, Sara, Senior Lecturer of Apparel, Design, and Hospitality Management, M.S., 2001, North Dakota State University
- Teigland, John J., Emeritus Professor of Education, Ph.D., 1964, University of North Dakota
- Terbizan, Donna J., Professor of Health, Nutrition and Exercise Sciences, Ph.D., 1982, Ohio State University
- Trautwein, Charlotte G., Emeritus Professor of Music and Human Development and Family Science and Education, M.S., 1968, University of Illinois
- Trautwein, John W., Emeritus Professor of Music and Education, M.M.Ed., 1961, American Conservatory of Music Advanced Certificate in Music Education, 1965, University of Illinois

- VanBerkum, Dennis W., Assistant Professor of Practice of Education, Ed.D., 1990, The University of South Dakota, Vermillion
- Vetter, Rachelle E., Associate Professor of Education; Extension Specialist, Ph.D., 2006, North Dakota State University
- Wageman, Justin, Associate Professor of Education, Ph.D., 1999, University of North Dakota
- Wallman, George H., Emeritus Professor of Education, Ph.D., 1980, Michigan State University
- Werlinger, Ann, Senior Lecturer of Human Development and Family Science, M.S., 2005, North Dakota State University
- Wigtil, James V., Emeritus Professor of Education, Ed.D., 1966, Indiana University
- Wilcox, Heidi, Adjunct Professor of Apparel, Design, and Hospitality Management, MPA, 2002, University of Mary
- Winters, Lynette, Director Emeriti of Health, Nutrition and Exercise Sciences, M.S., 1987, South Dakota State University
- Wood, Nathan, Associate Professor of Education, Ph.D., 2006, University of Minnesota
- Woods, Rebecca, Associate Professor of Human Development and Family Science, Ph.D., 2006, Texas A&M University
- Woods, William G., Emeritus Professor of Education, Ed.D., 1969, Washington State University
- Wyum, Dena, Senior Lecturer of Human Development and Family Science, M.S., 2008, North Dakota State University

Department of Apparel, Design, and Hospitality Management

www.ndsu.edu/adhm

Students graduating with majors in Apparel, Retail Merchandising and Design (ARMD); Hospitality and Tourism Management (HTM); or Interior Design (ID) have a strong general education component and specialized career preparation. Interdisciplinary curricula in the Apparel, Design and Hospitality Management (ADHM) Department may build upon economics and business, art, behavioral sciences, or natural sciences. The department offers three majors: ARMD, HTM, and ID. Two options are available within ARMD: apparel studies and retail merchandising. The retail merchandising option offers two emphasis areas: interior retail merchandising and textile product retail merchandising. Minors are available in ARMD and HTM. For more information about any of the programs, contact the department. New students are advised to contact the department prior to beginning their college work.

Enrichment Opportunities

The department supplements classroom learning through structured field experiences to hospitality operations, fashion, and design centers. Study tours to cities such as, Los Angeles, New York City, Minneapolis, Chicago, and to several countries, such as England, France, India, and Korea are scheduled regularly.

All three majors in the 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. ARMD students participate in the Fashion and Business Organization (FABO). In addition, they plan and implement a spring fashion show for the whole campus. The HTM student organization is the Hospitality Student Association (HSA). Their biggest event each year is the Food and Wine Show, which they organize and implement each spring as a fundraiser. The money earned goes toward a scholarship fund, some is used to defray costs of a field trip and the remainder is used for activities, special projects, and meetings 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. They compete biennially in Construction® to support the regional food bank. These students plan a trip to a place on interest each year. They have gone to Minneapolis and Chicago in recent years.

Professional enrichment is possible through departmental affiliation with the Fashion Institute of Technology, New York City, or various Study Abroad programs. NDSU students who attend these institutions for a semester or a year gain valuable experience in a fashion, merchandising, hospitality and tourism management, or interior design environment. Students should prepare to do this experience during their junior and/or senior year. Additional information about these programs is furnished upon request.

Fashion Institute of Technology Affiliation

The department 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 first year of study at NDSU, interested 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. Students who participate in this program spend their last year of study attending F.I.T.

Apparel, Retail Merchandising and Design (p. 373)

Fashion Institute of Technology Affiliation (p. 380)

Hospitality and Tourism Management (p. 380)

Interior Design (p. 383)

Apparel, Retail Merchandising and Design

Apparel, Retail Merchandising and 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.

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 two option areas. The first option is retail merchandising that provides students with a firm grasp of business strategy. Graduates hold positions as buyers, store managers, visual merchandisers, marketing managers, sales and account executives, and trend forecasters with many retail companies. An option in apparel studies 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. Graduates have accepted positions in product development, technical design, fashion journalism, quality control, museum collection management, and theatrical costuming. Others have used their skills to successfully run their own businesses.

Major Requirements

Major: Apparel, Retail Merchandising & Design Option: Apparel Studies

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	

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. Select from current general education list	6-7
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B):

ECON 105	Elements of Economics	3
PSYC 111	Introduction to Psychology	3
or SOC 110	Introduction to Sociology	

Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G):

ECON 105	Elements of Economics	3
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Total Credits	40
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Apparel Studies Option Major Requirements

General Education Requirements

40

Apparel Studies Option Requirements		
ADHM 155 or ADHM 370	Apparel Construction and Fit Sewn-Product Manufacturing and Analysis	3
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 310	History of Fashion	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 375	Professional Development	1
ADHM 385	Global Fashion Economics	3
ADHM 481	Capstone in Apparel, Retail Merchandising and Design	3
ADHM 486	Dress and Human Behavior	3
ADHM 489	Study Tour	1-3
Professional Electives: Select 21 credits from the following:		21
With adviser approval 6 of the 21 credits of professional electives may be taken from BUSN, MRKT, MGMT, THEA, COMM, or ART to meet the student's professional/personal objectives.		
ADHM 101	Beginning Apparel Construction	
ADHM 140	Introduction to the Hospitality Industry	
ADHM 141	Tourism and Travel Management	
ADHM 155	Apparel Construction and Fit	
ADHM 355	Flat Pattern Design & Draping	
ADHM 356	Pattern Drafting and Grading	
ADHM 357	Product Development: Designing Pants	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 372	Global Retailing	
ADHM 401	Convention and Meeting Planning	
ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 455	Advanced Apparel Assembly	
ADHM 470	Retail Financial Management and Control	
ADHM 485	Global Consumer Analysis	
ADHM 496	Field Experience	
COMM 216	Intercultural Communication	
COMM 271	Listening and Nonverbal Communication	
COMM 383	Organizational Communication I	
Minor Program of Study Required: 16 credit minimum required		16
Degree Requirements: Potential of 12 credits to reach 122		12
Total Credits		122-124

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.

Major Requirements

Major: Apparel, Retail Merchandising & Design Option: Retail Merchandising

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	

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. Select from current general education courses 6-7

Humanities & Fine Arts (A): Select one focus area 6

Focus Area One: Textile Product Merchandising		
ADHM 310	History of Fashion	
Select additional course from current general education courses		
Focus Area Two: Interior Merchandising		
ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	

Social & Behavioral Sciences (B):

ECON 105	Elements of Economics	3
PSYC 111	Introduction to Psychology	3

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

ECON 105	Elements of Economics	3
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Total Credits 40

Retail Merchandising Option Major Requirements

General Education Requirements 40

Retail Merchandising Option Requirements

ADHM 171	Fashion Dynamics	3
ADHM 271	Visual Merchandising and Promotion	3
ADHM 272	Product Development	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 372	Global Retailing	3
ADHM 375	Professional Development	1
ADHM 470	Retail Financial Management and Control	3
ADHM 481	Capstone in Apparel, Retail Merchandising and Design	3
ADHM 485	Global Consumer Analysis	3
ADHM 489	Study Tour	1-3
ADHM 496	Field Experience	3-6

Select one of the following: 3

COMM 216	Intercultural Communication	
COMM 271	Listening and Nonverbal Communication	
COMM 383	Organizational Communication I	

Business Minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor. 24

ACCT 102	Fundamentals of Accounting	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MRKT 362	Foundations of Retailing	

College of Business 300-400 level courses as approved by ADHM Department to total 24 credits.

(ADHM 372/MRKT 372 may be used as an elective)

Retail Merchandising Focus Area: Select Focus Area One - Textile Product Merchandising - or Focus Area Two - Interior Merchandising: 20-21

Focus Area One - Textile Product Merchandising Focus: 21 Credits

ADHM 181	Aesthetics and Visual Analysis of Apparel Products	
ADHM 310	History of Fashion	
ADHM 370	Sewn-Product Manufacturing and Analysis	
ADHM 385	Global Fashion Economics	
ADHM 486	Dress and Human Behavior	

Focus Area One Professional Electives: 6-8 Credits 6-8

ADHM 410	Dress in World Cultures	
ADHM 425	Experiential Retailing	
ADHM 491	Seminar (Product Production, Sourcing & Productivity)	
ADHM 491	Seminar (Photoshop/Illustrator for ARMD Majors)	

Total professional electives must bring total credits to 122. Additional courses to reach this credit total will be chosen with approval from advisor from the list below or from BUSN, MRKT, MGMT, THEA, COMM, or ART to meet students' professional/personal objectives.

Focus Area Two - Interior Merchandising Focus: 20 Credits

ADHM 151	Design Fundamentals	
ADHM 160	Interior Design Careers	
ADHM 161	Introduction to Manual Drafting	
ADHM 251	Interior Design Studio I-Residential	
ADHM 264	Residential Systems	
ADHM 315	History of Interiors I	
ADHM 316	History of Interiors II	
ADHM 368	Interior Materials	

Degree Requirements: Potential of 11 credits to reach 122 11

Total Credits 122-129

Degree Requirements and Notes

- Transfer courses from other institutions must have grades of 'C' or better to be accepted for the program.

Minor Requirements

Minor: Apparel, Retail Merchandising & Design Options: Apparel Studies and Retail Management

Required Credits: 21-22

Apparel Studies Minor Option

A total of 12 upper-division (300/400 level) courses must be taken

Required Courses

ADHM 171	Fashion Dynamics	3
ADHM 366	Textiles	3
ADHM 367	Textiles Laboratory	1
ADHM 155	Apparel Construction and Fit	3
or ADHM 370	Sewn-Product Manufacturing and Analysis	

Electives: 12 credits from the following: 12

ADHM 101	Beginning Apparel Construction	
ADHM 155	Apparel Construction and Fit	
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	
ADHM 271	Visual Merchandising and Promotion *	
ADHM 272	Product Development	
ADHM 310	History of Fashion	

ADHM 355	Flat Pattern Design & Draping
ADHM 356	Pattern Drafting and Grading
ADHM 370	Sewn-Product Manufacturing and Analysis
ADHM 372	Global Retailing
ADHM 385	Global Fashion Economics
ADHM 410	Dress in World Cultures
ADHM 425	Experiential Retailing
ADHM 470	Retail Financial Management and Control
ADHM 485	Global Consumer Analysis
ADHM 486	Dress and Human Behavior
ADHM 489	Study Tour

Total Credits **22**

Retail Management Minor Option

The Retail Management minor option is available to all majors in the College of Business.

Required Courses

ADHM 171	Fashion Dynamics	3
ADHM 181	Aesthetics and Visual Analysis of Apparel Products	3
ADHM 271	Visual Merchandising and Promotion	3

Electives: Select 12 credits from the following: **12**

ADHM 372	Global Retailing
ADHM 385	Global Fashion Economics
ADHM 470	Retail Financial Management and Control
ADHM 485	Global Consumer Analysis
MRKT 320	Foundations of Marketing
MRKT 362	Foundations of Retailing

Total Credits **21**

Minor Requirements and Notes:

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

The following plan suggests semester schedules that allow the student to complete his/her major/option degree program in a four year span. The arrangements of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion. The Plan of Study should be used alongside the official curriculum guide and with the assistance from your assigned advisor. Remember, this is only a guide and circumstances may change the plan.

Freshman

Fall	Credits	Spring	Credits
ADHM 171	3	ADHM 181	3
CSCI 114 or 116	3-4	COMM 110	3
ENGL 110 (w/ ENGL 100 lab)	3	ENGL 120	3
HD&E 189	1	PSYC 111 or SOC 110	3
Science/Tech	3	Minor/Elective/STATS prereq	3
Wellness	2-3		
	15-17		15

Sophomore

Fall	Credits	Spring	Credits	Summer	Credits
ECON 105	3	ADHM 155 or 370	3	ADHM 489	3
Minor/Elective	3	ADHM 271	3		
STAT 330 **	3	ADHM 272	3		

Humanities/Fine Arts	3 Prof Elective	3
Prof Elective	3 Science/Tech w lab	4
	15	16
		3

Junior

Fall	Credits Spring	Credits
ADHM 310	3 ENGL 320	3
ADHM 366	3 COMM 383 or Alt Comm course	3
ADHM 367	1 Minor Elective	3
ADHM 385	3 Minor Elective	3
ADHM 375	1 Prof Elective	3
ADHM 489*	1	
Prof Elective	3	
	15	15

Senior

Fall	Credits Spring	Credits
ADHM 486	3 ADHM 481	3
Minor/Elective	3 Minor/Elective	3
Minor/Elective	3 Prof Elective	3
Minor/Elective	3 Elective (as needed)	6
Prof Elective	3	
	15	15

Total Credits: 124-126

* Minimum 1 credit Study Tour in consultation with your advisor

** Prerequisites may apply

Freshman

Fall	Credits Spring	Credits
ADHM 171	3 ACCT 102	3
ENGL 110 (w/ ENGL 100 lab)	3 ADHM 181	3
COMM 110	3 CSCI 114 or 116	3-4
HD&E 189	1 ENGL 120	3
Humanities/Fine Arts	3 Elective (or STATS 330 prerequisite)	3
Wellness	2-3	
	15-16	15-16

Sophomore

Fall	Credits Spring	Credits
ADHM 310	3 ADHM 271	3
PSYC 111	3 ADHM 272	3
Science/Tech	3 ECON 105	3
STAT 330**	3 Science/Tech w lab	4
ADHM 489*	1 Elective	3
	13	16

Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 366 & ADHM 367	4	ADHM 370	3	ADHM 496	3-6
ADHM 372	3	ADHM 485	3		
ADHM 375	1	MGMT 320	3		
ENGL 320	3	Business Elective	3		
MRKT 320	3	Business Elective	3		
	14		15		3-6

Senior					
Fall	Credits	Spring	Credits		
ADHM 385	3	ADHM 481	3		
ADHM 470	3	Business Elective	3		
ADHM 486	3	COMM 383 or Alt Comm course	3		
MRKT 362	3	Prof Elective	3		
Prof Elective	3	Elective	3		
	15		15		

Total Credits: 121-126

* Minimum of 1 credit Study Tour required in consultation with your advisor

** Prerequisite may apply

Freshman					
Fall	Credits	Spring	Credits		
ADHM 160	1	ADHM 151	3		
ADHM 161	3	COMM 110	3		
ADHM 171	3	CSCI 114 or 116	3-4		
ENGL 110 (w Eng 100 lab)	3	ECON 105	3		
HD&E 189	1	ENGL 120	3		
PSYC 111	3				
	14		15-16		

Sophomore					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 251	3	ADHM 271	3	ADHM 489	3
ADHM 264	2	ADHM 272	3		
Science & Tech	3	STAT 330	3		
ACCT 102	3	Science & Tech w/Lab	4		
Wellness	2-3	Elective	3		
Elective	2-3				
	15-17		16		3

Junior					
Fall	Credits	Spring	Credits	Summer	Credits
ADHM 315	3	ADHM 316	3	ADHM 496	3-6
ADHM 366	3	ADHM 368	2		
ADHM 367	1	COMM 383 (or Alternative)	3		
ADHM 375	1	ENGL 320	3		

MGMT 320	3	MRKT 320	3
Elective/Diversity	3		
ADHM 489	1		
	15		14
			3-6
Senior			
Fall	Credits Spring		Credits
ADHM 372	3	ADHM 481	3
ADHM 470	3	MRKT 362	3
ADHM 485	3	BUSN Elective	3
BUSN Elective	3	BUSN Elective	3
Elective (as needed)	3	Elective (as needed)	3
	15		15

Total Credits: 125-131

Fashion Institute of Technology Affiliation

The department 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 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. Students who participate in this program spend their last year of study attending F.I.T.

Hospitality and Tourism Management

Hospitality and 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 so, Hospitality and Tourism Management (HTM) is a great field for you!

The mission of the HTM program at NDSU is to develop effective and efficient leaders in a very dynamic and exciting field. 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.

We are the only four-year HTM program in North Dakota, 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.

- 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 resources such as people, materials, money, 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, casino and professional club management, resorts, and convention and meeting planning.
- 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.

Major Requirements

Major: Hospitality & Tourism Management

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select from current general education list.		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
CHEM 117 or CHEM 121	Chemical Concepts and Applications General Chemistry I	3
CSCI 114 or CSCI 116	Microcomputer Packages Business Use of Computers	3-4
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. Select from current general education list		3-4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 105	Elements of Economics	3
Select from current general education list		3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from the current general education list		
Global Perspectives (G):		
ECON 105	Elements of Economics	3
Total Credits		40

Major Requirements

General Education Requirements		40
Hospitality & Tourism Management Requirements		
ADHM 140	Introduction to the Hospitality Industry	3
ADHM 141	Tourism and Travel Management	3
ADHM 241	Hospitality Accounting	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
HNES 141	Food Sanitation	1
HNES 261	Food Selection and Preparation Principles	3
HNES 261L	Food Selection and Preparation Principles Laboratory	2
HD&E 320	Professional Issues	1
Professional Elective Courses: Select 13-15 credits from the following:		13-15
ADHM 384	Beverage Operations	
ADHM 401	Convention and Meeting Planning	
ADHM 402	Professional Catering Management	
ADHM 403	Resort Development and Management	
ADHM 405	Casino Operations	
ADHM 406	Professional Club Management	
ADHM 411	Food and World Cultures	
ADHM 425	Experiential Retailing	
ADHM 489	Study Tour	

ADHM 491	Seminar	
EMGT 461	Business Continuity and Crisis Management	
Business Administration Minor requires an application to the College of Business and a minimum 2.5 GPA in courses used for the minor.		24
ACCT 102 or ACCT 200 & ACCT 201	Fundamentals of Accounting Elements of Accounting I and Elements of Accounting II	
ECON 105 or ECON 201 & ECON 202	Elements of Economics Principles of Microeconomics and Principles of Macroeconomics	
MGMT 320	Foundations of Management	
MRKT 320	Foundations of Marketing	
MGMT 450	Human Resource Management	
College of Business 300-400 level (9 credits)		
Degree Requirements: Potential of a minimum of 9 credits to reach 122		9
Degree Requirements and Notes: Courses taken Pass/Fail will not be used to satisfy any requirements other than total credits.		
Total Credits		122-124

Degree Requirements and Notes

- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Minor Requirements

Hospitality & Tourism Management Minor

Minor Requirements

Required Credits: 18

Required Courses

ADHM 140 or ADHM 141	Introduction to the Hospitality Industry Tourism and Travel Management	3
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Elective Courses: Select 15 credits from the following: 15

ADHM 140	Introduction to the Hospitality Industry (if not used above)	
ADHM 141	Tourism and Travel Management (if not used above)	
ADHM 241	Hospitality Accounting	
ADHM 360	Lodging Operations Management	
ADHM 381	Hospitality Marketing and Sales	
ADHM 384	Beverage Operations	
ADHM 401	Convention and Meeting Planning	
ADHM 402	Professional Catering Management	
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	
ADHM 491	Seminar	

Total Credits 18

Minor Requirements and Notes

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

The following plan suggests semester schedules that allow the student to complete his/her major/option degree program in a four year span. The arrangements of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion. The Plan of Study should be used alongside the official curriculum guide and with the assistance from your assigned advisor. Remember, this is only a guide and circumstances may change the plan.

Freshman					
Fall	Credits	Spring	Credits		
ADHM 140	3	ACCT 102	3		
CSCI 114 or 116	3-4	ADHM 141	3		
ENGL 110 (w/ ENGL 100)	3	ENGL 120	3		
HD&E 189	1	Humanities/Fine Arts	3		
Social/Beh Science	3	Quantitative Reasoning	3		
Wellness	2-3				
	15-17		15		
Sophomore					
Fall	Credits	Spring	Credits		
COMM 110	3	ADHM 360	3		
CHEM 117 or 121	3	ECON 105	3		
ADHM 241	3	HNES 141	1		
HTM Option/Elective	3	Science/Tech w lab	4		
HTM Option/Elective	3	Humanities/Fine Arts	3		
	15		14		
Junior					
Fall	Credits	Spring	Credits	Summer	Credits
MGMT 320	3	ADHM 381	3	ADHM 496	3
MRKT 320	3	ADHM 435	3		
HD&E 320	1	MGMT 450	3		
HNES 261	3	Upper Div Writing	3		
HNES 261L	2	HTM Op/Elec	3		
Elective	3				
	15		15		3
Senior					
Fall	Credits	Spring	Credits		
ADHM 404	3	ADHM 479	3		
ADHM 404L	2	Business Elective	3		
ADHM 467	3	HTM OP/Elective	3		
Business Elective	3	HTM Op/Elective	1-3		
Business Elective	3	Electives as needed	3		
Elective	3				
	17		13-15		

Total Credits: 122-126

Interior Design

Interior Design Major

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.

Students pursue courses in which creative and technical skills are applied within a structure to achieve the built interior environment. Design solutions are functional, enhance the quality of life of occupants, and are aesthetically attractive while adhering to code and regulatory information. Design solutions produced protect and enhance the health, safety and welfare of the public. Students learn how to approach design problems through a methodology that includes data gathering, product specification, identification of details, contractual documents and design business procedures.

The first two years of the program introduce the fundamentals of design, visual and technical communication techniques (including drafting, CADD, perspective drawing, model building and rendering) and theoretical and practical applications (including anthropometrics, ergonomics, interior design technology and color theory). 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.

Upper-division course work is focused on a series of integrated studio experiences and support courses including history, interior materials, professional practice, building information modeling and interior systems. The studio experience culminates in a senior 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.

North Dakota State University interior design students are required to complete a field experience between the junior and senior year. Students accept a variety of positions throughout the United States. In the past few years students have completed field experiences in cities such as Los Angeles, Minneapolis, Denver, New York, and Shanghai, China.

Enrollment in sophomore level interior design courses requires a 3.0 institutional cumulative grade-point average. Admission into the third-year studio is based upon demonstrated professional interest, a portfolio review completed during the spring semester of the student's sophomore year, a 3.0 institutional cumulative grade-point average, and a minimum grade of 'C' in all major core requirements. Students must maintain the 3.0 minimum cumulative GPA and earn a grade of 'C' or better in all major core requirements throughout the remainder of the program. All students successfully completing sophomore review are required to purchase a laptop computer for upper division studio courses.

Transfer students entering the interior design program should contact the program coordinator to review previously completed interior design or related course work.

The interior design program at NDSU is accredited by the Council for Interior Design Accreditation and the National Association of Schools of Art and Design.

Major Requirements

Major: Interior Design

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select from current general education list.		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	

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. Select from current general education list. 6-7

Humanities & Fine Arts (A):

ADHM 315	History of Interiors I	3
ADHM 316	History of Interiors II	3

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

Major Requirements

Students must maintain a 3.00 cumulative GPA and a minimum grade of 'C' in all major core requirements.

General Education Requirements		40
Interior Design Core Requirements		
ADHM 151	Design Fundamentals	3
ADHM 160	Interior Design Careers	1
ADHM 161	Introduction to Manual Drafting	3
ADHM 162	Intermediate Manual Drafting	3
ADHM 251	Interior Design Studio I-Residential	3
ADHM 253	Interior Design Studio II-Office Design	2
ADHM 254	Interior Design Studio III	2
ADHM 261	Visual Communications	3
ADHM 264	Residential Systems	2
ADHM 300	Design Resource Management	1-3
ADHM 351	Interior Design Studio IV-Advanced Residential	3
ADHM 353	Interior Design Studio V-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	2
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
HD&E 320	Professional Issues	1
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: Business; Hospitality and Tourism Management; Apparel, Retail Merchandising and Design; French; Spanish; German; Communication; History; Gerontology; Emergency Management; Natural Resource Management; other minor options may be approved by interior design faculty.		
Elective for Degree Completion - one credit may be needed to bring degree total to 122 credits.		1
Total Credits		122-125

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

The following plan suggest semester schedules that allow the student to complete his/her major/option degree program in a four year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites and co-requisites required for successful completion. This Plan of Study should be used alongside the official curriculum guide and with assistance from your assigned advisor. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ADHM 151	3	ADHM 162	3
ADHM 160	1	ADHM 261	3
ADHM 161	3	COMM 110	3

ENGL 110	3	ENGL 120	3	
HD&E 189	1	Quantitative Reasoning	3	
Social/Beh Science	3	Wellness	2	
	14		17	
Sophomore				
Fall	Credits	Spring	Credits	
ADHM 251	3	ADHM 253	2	
ADHM 264	2	ADHM 254	2	
ADHM 365	3	ADHM 368	2	
ART 111, 210, or 211	3	CSCI 114 or 116	3-4	
Science/Tech w/Lab	4	Science/Tech	3	
		Minor Course	3	
	15		15-16	
Junior				
Fall	Credits	Spring	Credits	Summer
				Credits
ADHM 315	3	ADHM 300	1	ADHM 496
				3
ADHM 351	3	ADHM 316	3	
ADHM 363	3	ADHM 353	3	
ADHM 460	3	ADHM 461	3	
ADHM 491	1	HD&E 320	1	
Minor Course	3	Social/Behavioral Sci	3	
		Minor Course	3	
	16		17	3
Senior				
Fall	Credits	Spring	Credits	
ADHM 366 & ADHM 367	4	ADHM 452	6	
ADHM 450	3	ADHM 491	1	
Upper Div Writing	3	Minor Course	3	
Minor Course	3	Minor Course	3	
	13		13	

Total Credits: 123-124

* **Minor Options:** Business, Hospitality & Tourism Management, Apparel & Textiles Minor, Retail Merchandising, Foreign Language, Communication, History, Gerontology, Emergency Management, Natural Resource Management, or as approved by Interior Design faculty. (Total credits required to complete minors will vary).

School of Education

www.ndsu.edu/education

Students contemplating careers in education may be encouraged to learn there is a shortage of teachers in certain academic and geographical areas. This trend, together with the knowledge that preparation in teaching may also lead to successful careers in business, industry, and the public sector, makes education an excellent choice.

Programs in education at NDSU are administered by the School of Education. The School of Education programs are accredited at the undergraduate and graduate levels by the National Council for Accreditation of Teacher Education (NCATE) and are approved by the North Dakota Education Standards and Practices Board. NCATE accreditation assures that graduates of the program may be certified/licensed as teachers in other states, and also indicates that the programs offered through the School of Education are of high quality.

Through the School of Education, students are prepared to be teachers, counselors, and school administrators 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 to the elimination of inequitable instructional and institutional practices.

Admission to the School of Education

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. Late application may delay completion of 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 courses.

The Council for Teacher Education 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 Teacher Education Office (<https://www.ndsu.edu/education>).

Admission of Undergraduate Students

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 evidence of competence in English through any one of the following:
 - Minimum ACT English test standard score of 20
 - Minimum grade-point average of 2.50 in ENGL 110 College Composition I and ENGL 120 College Composition II or equivalent
 - Minimum of a 'B' grade in English 358 or equivalent writing course
4. Provide a letter of recommendation.
5. Complete 20 hours working with youth within 24 months of application.
6. Submit completed curriculum guide.
7. 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 Policies

Prior to student teaching, all student teachers must meet all School of Education requirements including completion and submission of the verification of requirements form (available from the Teacher Education Office (<https://www.ndsu.edu/education>)). 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.

Program Exit Requirements

1. Students must complete a capstone portfolio based on the Interstate New Teachers Assessment and Support Consortium (InTASC) standards.
2. Students 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. Pass the Praxis II tests (Subject Assessment and Principles of Learning and Teaching (PLT))
4. Students may complete an application for state certification/licensure and pay the appropriate fee to the state upon completion of the program.

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.

NDSU Student North Dakota United Association

Students in Teacher Education are encouraged to join the NDSU Student North Dakota United Association (SNDU), which is affiliated with the Student North Dakota United Association and the National Education Association Student Program. Members of this organization receive a number of benefits including workshops, publications, and liability insurance, and have the opportunities to be involved with many of the committees that govern the Teacher Education program at NDSU.

Persons interested in membership details should contact the School of Education (<https://www.ndsu.edu/education>) or the SNDU Student Program adviser.

Students also are encouraged to join the professional organization(s) relevant to their teaching specialties.

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.

Human and Community Education

State approved programs for the preparation of vocational education teachers are grouped under Human and Community Education (H&CE). Curricula in two areas are offered: Agricultural Education and Family and Consumer Sciences Education.

Agricultural Education

NDSU is designated by the State Board for Career and Technical Education as the recognized institution for preparing teachers of agricultural education. Programs are offered to prepare students for teaching agricultural education at the secondary, post-secondary, and adult levels. Graduates also secure employment in other agricultural occupations such as Cooperative Extension, government services, and agribusiness.

Upon completion of the program, students are eligible for certification to teach agricultural education in North Dakota and may be qualified for certification/licensure in a number of other states.

Family and Consumer Sciences Education

The Family and Consumer Sciences Education program at NDSU has been approved by the State Board for Career and Technical Education for the preparation of family and consumer sciences teachers. Thus, graduates are qualified to teach family and consumer sciences classes in vocational or non-vocational school programs at junior and senior high school levels. Graduates also are qualified to teach in adult education programs and to serve as extension educators. Alternate career opportunities include positions with utility companies, health and human service agencies, and retail establishments. In addition to fulfilling teacher certification/licensure requirements for North Dakota, graduates may be qualified for certification/licensure in a number of other states.

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 HDFL 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.

Title II Institutional Report

To comply with the requirements of Section 207 of Title II of the Higher Education Act, NDSU has provided the following information to the North Dakota Education Standards and Practices Board.

Pass rates

- **PPST Reading:**
 - Number Taking: 128; Average Score: 180
 - Number Passing: 128; Pass Rate: 100%
- **PPST Writing:**
 - Number Taking: 128; Average Score: 177
 - Number Passing: 128; Pass Rate: 100%
- **PPST Mathematics:**
 - Number Taking: 128; Average Score: 182
 - Number Passing: 128; Pass Rate: 100%

Supervised Experience

Number of students in the regular teacher preparation program:

- Total number of students enrolled during 2013-2014: **192**

Information about supervised student teaching:

1. Number of students in programs of supervised student teaching during academic year 2013-2014: **90**
2. Number of supervising faculty who were:
 - Number of full time equivalent faculty supervising clinical experience during this academic year: **24**
 - Number of adjunct faculty supervising clinical experience during this academic year: **0**
 - Appointed part time in professional education, not otherwise employed by the institution: **14**
3. The average number of hours per week required of student participation in supervised student teaching in these programs was: **40 hours**. The total number of weeks of supervised student teaching required is **16 weeks**. The total number of hours required is **640 hours**.
4. Information about state approval or accreditation of teacher preparation programs:
 - a. Is your teacher preparation program currently approved or accredited by the state? **Yes**
 - b. Is your teacher preparation program currently under a designation as "low-performing" by the state (as per section 208(a) of the HEA of 1998)?
No

Section III. Contextual information

The School of Education at NDSU is accredited by the National Council for Accreditation of Teacher Education (NCATE), 2010 Massachusetts Ave NW, Suite 5000, Washington, DC, 20036; (202) 466-7496. This accreditation covers the institution's initial and advanced teacher education, advanced educational leadership, and advanced school counseling programs.

The School Counseling program is accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP), 5999 Stevenson Avenue, Alexandria, VA, 22304; (703) 823-9800.

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.

All initial Teacher Education candidates are required to prepare and submit portfolios as part of the assessment process.

For more information, contact Chair, NDSU School of Education (<https://www.ndsu.edu/education>), Dept. 2625, P.O. Box 6050, Fargo, ND, 58108-6050, 231-7921.

Teaching Specialty - Agriculture (p. 390)

Teaching Specialty - Art (p. 391)

Teaching Specialty - Biological Sciences (p. 393)

Teaching Specialty - Chemistry (p. 395)

Teaching Specialty - Comprehensive Science (p. 397)

Teaching Specialty - Earth Science (p. 398)

Teaching Specialty - HDFS & Elementary Education (VCSU) (p. 406)

Teaching Specialty - English (p. 400)

Extension Education (p. 403)

Teaching Specialty - Family & Consumer Sciences (p. 403)

Teaching Specialty - French (p. 405)

Teaching Specialty - Health (School Health) (p. 409)

Teaching Specialty - History (p. 412)

Teaching Specialty - Mathematics (p. 414)

Teaching Specialty - Music (Instrumental) (p. 415)

Teaching Specialty - Music (Vocal) (p. 417)

Teaching Specialty - Physical Education (p. 419)

Teaching Specialty - Physics (p. 422)

Teaching Specialty - Social Sciences (p. 424)

Teaching Specialty - Spanish (p. 425)

Teaching Specialty - Agricultural

Major Requirements

Major: Agriculture Education

Degree Type: B.S.

Required Degree Credits to Graduate: 130

General Education Requirements

First Year Experience (F):

AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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ENGL 358	Writing in the Humanities and Social Sciences	3
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

Select one of the following:		4
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CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	
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CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
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PLSC 110	World Food Crops	3
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PLSC 315	Genetics	3
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B):

ECON 201	Principles of Microeconomics	3
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ECON 202	Principles of Macroeconomics	3
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from the current general education list		
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Global Perspectives (G):		
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ECON 201	Principles of Microeconomics	3
Total Credits		40

Major Requirements

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

General Education Requirements		40
Agriculture Education Requirements		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
BIOL 315L	Genetics Laboratory	1
Teaching Specialty Requirements		
AGEC 242	Introduction to Agricultural Management	3
AGEC	Electives	6
ASM 125	Fabrication & Construction Technology	3
ASM	Engineering Electives	6
IME 335	Welding Technology	3
ANSC 114	Introduction to Animal Sciences	3
ANSC 223	Introduction to Animal Nutrition	2
ANSC	Electives	6
PLSC 210	Horticulture Science	3
PLSC 211	Horticulture Science Lab	1
SOIL 210	Introduction to Soil Science	3
PLSC or SOIL	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	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		130

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 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 P/F may not be used to satisfy any requirements.
- See School of Education (<https://www.ndsu.edu/education>) for admission requirements.

Teaching Specialty - Art

Major Requirements

Major: Art Education

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

Required Degree Credits to Graduate: 122**General Education Requirements**

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
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 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A):		
ART 210	Art History I	3
ART 211	Art History II	3
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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	Two-Dimensional Design	3
ART 124	Three-Dimensional 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
or ART 185	Design and Digital Media I	
ART 230	Drawing II	3
ART 330	Drawing III	3
Art Studio or Art History Elective: Select 3 credits		3
Intermediate Studio Course: Select 3 credits from the following:		3
ART 220	Painting II	
ART 250	Ceramics II	
ART 260	Sculpture II	
ART 270	Printmaking II	
ART 280	Photography II	
ART 285	Design and Digital Media II	
Upper Division Studio Electives: Select 3 credits from the following:		3
ART 320	Painting III	
ART 350	Ceramics III	
ART 360	Sculpture III	
ART 370	Printmaking III	
ART 380	Photography III	
ART 385	Design and Digital Media III	
ART 420	Painting IV	
ART 430	Drawing IV	
ART 435	Advanced Figure Drawing	
ART 450	Ceramics IV	
ART 460	Sculpture IV	
ART 470	Printmaking IV	
ART 480	Photography IV	
ART 485	Design and Digital Media IV	
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 credits		3
ART 489	Baccalaureate Project (Capstone)	
Degree Requirements: Potential of 10 credits to reach the minimum of 122		10
Total Credits		122

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.

Teaching Specialty - Biological Sciences

Major Requirements

Major: Biological Sciences Education

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

Required Degree Credits to Graduate: 140

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 146	Applied Calculus I	4
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be satisfied by completing the requirements for the teaching specialty.		10
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G):		
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GEOL 105	Physical Geology	3
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Total Credits		41
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Major Requirements

General Education Requirements		40
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Professional Education Requirements		
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EDUC 321	Introduction to Teaching	3
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EDUC 322	Educational Psychology	3
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EDUC 451	Instructional Planning, Methods and Assessment	3
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EDUC 481	Classroom Practice Methods of Teaching I: (Science)	3
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EDUC 485	Student Teaching Seminar	1
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EDUC 486	Classroom Management for Diverse Learners	3
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EDUC 487	Student Teaching	9
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EDUC 488	Applied Student Teaching	3
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EDUC 489	Teaching Students of Diverse Backgrounds	3
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Teaching Specialty Requirements		
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BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
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BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
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BIOL 151 & 151L	General Biology II and General Biology II Laboratory	4
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BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory	4
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BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
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BIOL 364	General Ecology	3
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BIOL 359	Evolution	3
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BIOL 491	Seminar (Capstone)	2
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Select one of the following:		4
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BOT 315 & 315L	Genetics and Genetics Laboratory	
ZOO 315 & 315L	Genetics and Genetics Laboratory	
Botony Elective	300-400 Level Elective	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
CHEM 240	Survey of Organic Chemistry	3
CHEM 260	Elements of Biochemistry	4
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 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
STAT 330	Introductory Statistics	3
ZOO 370	Cell Biology	3
Zoology Elective	300-400 Level Elective	3
Computer Science Elective	Elective	3
Total Credits		140

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.

Teaching Specialty - Chemistry

Major Requirements

Major: Chemistry Education

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

Required Degree Credits to Graduate: 136

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
GEOL 105	Physical Geology	3
GEOL 106	The Earth Through Time	3

Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B): Select from current general education list	6
Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G):	
GEOL 105 Physical Geology	3

Total Credits **40**

Major Requirements

General Education Requirements 40

Departmental Requirements

GEOL 105L Physical Geology Lab	1
GEOL 106L The Earth Through Time Lab	1

Teaching Specialty Requirements

Select one of the following: 4

BIOL 150 & 150L General Biology I and General Biology I Laboratory	
BIOL 151 & 151L General Biology II and General Biology II Laboratory	
BIOC 460 Foundations of Biochemistry and Molecular Biology I	3
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 364 Physical Chemistry I	3
CHEM 365 Physical Chemistry II	3
CHEM 425 Inorganic Chemistry I	3
CHEM 431 & 431L Analytical Chemistry I and Analytical Chemistry I Laboratory	5
CHEM 491 Seminar (Senior Capstone)	2
PHYS 251 & 251L University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L University Physics II and University Physics II Laboratory	5
MATH 165 Calculus I	4
MATH 166 Calculus II	4
MATH 259 Multivariate Calculus	3-4
or MATH 265 Calculus III	
MATH 266 Introduction to Differential Equations	3

Select sequence A or sequence 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	

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 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**136****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.

Teaching Specialty - Comprehensive Science**Major Requirements****Major: Comprehensive Science Education**

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

Required Degree Credits to Graduate: 136

General Education Requirements**First Year Experience (F):**

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be satisfied by completing the requirements for the teaching specialty. 10

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2**Cultural Diversity (D): Select from current general education list****Global Perspectives (G):**

GEOL 105	Physical Geology	3
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Total Credits**40****Major Requirements****General Education Requirements** 40**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 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		
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	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
BIOL 491	Seminar	2
BOT 372	Structure and Diversity of Plants and Fungi	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
CHEM 260	Elements of Biochemistry	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	4
Computer Science Elective	Elective	2
MATH 165	Calculus I	4
MATH 166	Calculus II	4
PHYS 110	Introductory Astronomy	3
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
Biology/Botany/Zoology Elective	300-400 Level	6
Total Credits		136

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.

Teaching Specialty - Earth Science

Major Requirements

Major: Earth Science Education

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

Required Degree Credits to Graduate: 139

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
The 10 credits required in the Science and Technology category will be satisfied by completing the requirements for the teaching specialty.		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
GEOL 105	Physical Geology	3
Total Credits		41

Major Requirements

General Education Requirements		40
Earth Science Education Requirements		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
STAT 330	Introductory Statistics	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 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		
BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	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
Biological Sciences Elective	Elective	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
Chemistry Elective	Elective	4
GEOL 303 & GEOL 350	Paleontology Field Course and Invertebrate Paleontology	4
GEOL 412	Geomorphology	3
GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
GEOL 422	Petrology	3
GEOL 423	Petrography	1
GEOL 491	Seminar	1

Geology Electives	Electives	6
PHYS 110	Introductory Astronomy	3
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
SOIL 217	Introduction to Meteorology & Climatology	3
CSCI 122	Visual BASIC	3
Total Credits		139

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.

Teaching Specialty - English

Major Requirements

Major: English Education Option

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

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. Select from current general education list 10

Humanities & Fine Arts (A):

The 6 credits required in this category will be satisfied by completing the teaching specialty requirements with either British or American Literature. 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D):

Second Year Language Course for BA degree

Select from current general education list for BS degree

Global Perspectives (G):

First Year Language Course for BA degree

Select from current general education list for BS degree

Total Credits 40

Major Requirements

GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.

General Education Requirements

40

Teaching Specialty Requirements

ENGL 358	Writing in the Humanities and Social Sciences (includes)	3
ENGL 209	Introduction to Linguistics	3
ENGL 222	Introduction to Poetry	3
ENGL 240	World Literature Masterpieces	3
ENGL 271	Literary Analysis	3
ENGL 315	British Literature I	3
or ENGL 316	British Literature II	
ENGL 317	American Literature I	3
or ENGL 318	American Literature II	
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

A modern foreign language through the intermediate competency (200) level is required. 14

Degree Requirements: Potential of a minimum of 1 credits to reach 122 1

Total Credits 122

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.

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.

Major Requirements**Major: English Education with Communication Option**

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

Required Degree Credits to Graduate: 130

General Education Requirements**First Year Experience (F):**

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education courses 3

Science & Technology (S):

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. Select from current general education courses 10

Humanities & Fine Arts (A):

The 6 credits required in this category will be satisfied by completing the teaching specialty requirements with either British or American Literature. 6

Social & Behavioral Sciences (B):

COMM 112 Understanding Media and Social Change 3

COMM 114 Human Communication 3

Wellness (W): Select from current general education courses 2

Cultural Diversity (D):

COMM 216 Intercultural Communication 3

Global Perspectives (G): Select from current general education courses

Total Credits 40

Major Requirements

GPA of 2.75 or better in the teaching specialty is required for placement in student teaching and exit from the program.

General Education Requirements 40

Teaching Specialty Requirements

ENGL 358 Writing in the Humanities and Social Sciences 3

ENGL 209 Introduction to Linguistics 3

ENGL 222 Introduction to Poetry 3

ENGL 240 World Literature Masterpieces 3

ENGL 271 Literary Analysis 3

ENGL 315 British Literature I 3

or ENGL 316 British Literature II 3

ENGL 317 American Literature I 3

or ENGL 318 American Literature II 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 481 Classroom Practice Methods of Teaching I: (Communication) 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

Communication Courses

COMM 112 Understanding Media and Social Change (includes) 3

COMM 114 Human Communication (includes) 3

COMM 216 Intercultural Communication 3

COMM 301 Rhetorical Traditions 3

COMM 312 Oral Performance Studies 3

COMM 318 Argumentation and Advocacy 3

COMM 451	Directing Forensics	2
Total Credits		130

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.

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.

Extension Education Minor

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 through the Agricultural Education and the Family and Consumer Sciences Education programs. The minor is appropriate for many majors across the University including Human Development and Education and the College of Agriculture, Food Systems, and Natural Resources.

Minor Requirements

Extension Education Minor

Minor Requirements

Required Credits: 16-17

Required Courses

H&CE 446	Extension Education (Required)	2
EDUC 322	Educational Psychology (OR)	3
HDFS 230	Life Span Development	
NRM 421	Environmental Outreach Methods (OR)	3
H&CE 468	Methods of Teaching Family and Consumer Sciences I: Techniques	
H&CE 480	Science, Technology, Engineering & Mathematics Teaching Methods in Agricultural Education (OR)	3
HDFS 310	Citizenship & Social Activism (OR)	
HDFS 360	Adult Development and Aging	
H&CE 496	Field Experience (Internship) <small>Additional Field Experience credit may be warranted if additional time in the internship experience is required.</small>	5-6

Total Credits **16-17**

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.

Teaching Specialty - Family and Consumer Sciences

Major Requirements

Major: Family & Consumer Sciences Education

Degree Type: B.S.

Required Degree Credits to Graduate: 130

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
CHEM 117	Chemical Concepts and Applications	3
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. Select from current general education list		3-4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
Wellness (W):		
HNES 200	Principles of Nutrition	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

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.

General Education Requirements		40
Family & Consumer Sciences Education 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 135	Family Science	3
HDFS 186	Consumer and Society	3
HDFS 230	Life Span Development	3
HDFS 242	Couples, Marriages and Families	3
HDFS 341	Parent-Child Relations	3
HDFS 357	Personal and Family Finance	3
HDFS 462	Methods of Family Life Education	3
HDFS 475	Children and Families Across Cultures	3
H&CE 469	Housing Education and Issues	3
HNES 141	Food Sanitation	1
HNES 200	Principles of Nutrition	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:		1-3
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		130-132

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.

Teaching Specialty - French

Major Requirements

Major: French Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
FREN 360	Studies in Language and Style	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

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. Select from current general education list 10

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

Major Requirements

General Education Requirements 40

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 401	Approaches to Literature	3
Select four of the following:		12
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 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		
A minimum of one year of a second foreign language is required with grades of 'C' or better in both courses.		
Ancillary Electives		
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
Degree Requirements: Potential of a minimum of 8 credits to reach 122		8
Total Credits		122-136

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.

HDFS Child Development Option & Elementary Education Dual Degree Program

HDFS & Elementary Education Dual Degree Program

The Human Development and Family Science (Child Development option) & Elementary Education program is a collaborative effort between NDSU and Valley City State University (<http://www.vcsu.edu>) (VCSU). Through this curriculum, offered on the NDSU campus, students are concurrently enrolled in both universities, culminating in a bachelor's degree from NDSU in Human Development and Family Science (Child Development option) as well as a bachelor's degree from VCSU in Elementary Education. 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 and helps future teachers understand development and its diversity, making them more effective teachers and helping them work with children from a wide variety of backgrounds.

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.

Required Degree Credits to Graduate: 126

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 104	Finite Mathematics	3
Science & Technology (S):		
BIOL		3
CHEM or PHYS		3
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
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. Select from current general education list		1
Humanities & Fine Arts (A):		
HIST 103	U.S. to 1877	3
or HIST 104	U.S. Since 1877	
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
PSYC 250	Developmental Psychology	3
Wellness (W):		
HDFS 242	Couples, Marriages and Families	3
Cultural Diversity (D):		
HDFS 475	Children and Families Across Cultures	3
Global Perspectives (G):		
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
Total Credits		41

Major Requirements

Code	Title	Credits
General Education Requirements		40
HDFS & Elementary Education Requirements		
HDFS 110	Introduction to Human Development and Family Science	1
HDFS 135	Family Science	3

HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 330	Child Development	3
HDFS 475	Children and Families Across Cultures	3
EDUC 210	Creative Activities	2
EDUC 240	Educating Exceptional Students	2
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.)	3
& HDFS 496	Field Experience (1 cr.)	
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.)	11
& HDFS 496	Field Experience (1 cr.)	
HDFS Electives: (Cannot take HDFS 230 or HDFS 496)		
HDFS	Elective	3
HDFS	300-400 level	6
Other Elementary Education Requirements		
CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
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
College Requirement		
HD&E 320	Professional Issues	1
Total Credits		126-127

Degree Requirements and Notes

- A grade of 'C' or better is required for all HDFS courses for graduation.
- 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.
- 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.

Plan of Study Grid

				Freshman
	Fall	Credits	Spring	Credits
HD&E 189		1 ENGL 120		3
ENGL 110		3 MATH 104		3
Science/Tech Gen Ed		3 CSCI 114 or 116		3-4
ENGL 100		1 HIST 103 or 104		3
PSYC 111		3 PSYC 250		3
COMM 110		3		

HDFS 110	1		
HDFS 135	3		
	17		15-16

					Sophomore
Fall	Credits	Spring	Credits		
Science/Tech Gen Ed	3	HDFS 250	3		
Matching Science Gen Ed Lat	1	HDFS 330	3		
Humanities/Fine Arts Gen Ed	3	HDFS 300-400 level elective	3		
HDFS 242	3	EDUC 250 Intro to Ed	3		
HDFS elective ^{any level}	3	EDUC 283 Understanding Cultural Diversity	3		
HDFS 300-400 level elective	3				
	16		15		

					Junior
Fall	Credits	Spring	Credits	Summer	Credits
HDFS 475	3	HD&E 320	1	EDUC 210 Creative Activities	2
Science/Tech Gen Ed	3	Directed Elective	2-3	Directed Electives	0-3
EDUC 300 Ed. Tech	2	EDUC 315 Math Methods	3		
EDUC 240 Exeptional Studen	2	EDUC 320 Social Studies Met	3		
Math 277 Math for Elem I	3	EDUC 321 Foundation of Reading	3		
EDUC 352 Culturally Diverse	1	EDUC 330 Children's Literatur	3		
Geography	2	EDUC 450 Assessment and Ed Issues	2		
		Math 278 Math for Elem II	2		
	16		19-20		2-5

					Senior
Fall	Credits	Spring	Credits		
ENGL 325 or 358 or 459	3	EDUC 400 Ed Psych	2		
EDUC 322 Language Arts Me	3	EDUC 490 Student Teaching	10		
EDUC 323 Reading Methods	2	HDFS 496 (automatic enrollment) ^{The} registrar will automatically enroll students during student teaching semester	1		
EDUC 350 Elem. Practicum	2	EDUC 491 (Senior portfolio may be taken in fall or spring of senior year)	1		
EDUC 355 Science Methods	3				
Directed Electives	3-6				
	16-19		14		

Total Credits: 130-138

Teaching Specialty - Health Education

Major Requirements

Major: Health Education - School Health

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
Wellness (W):		
HNES 217	Personal and Community Health *	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

Major Requirements

Code	Title	Credits
General Education Requirements		40
Teaching Specialty Requirements		
HDFS 135	Family Science **	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HNES 110	Introduction to Health and Physical Education *	3
HNES 200	Principles of Nutrition *	3
or HNES 250	Nutrition Science	
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
College Requirement		
HD&E 320	Professional Issues	1

Degree Requirement: Potential of 19 credits to reach 122	19
Total Credits	122

* 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 EDUCATION MAJOR School Health (K-12) Option

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four-year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The 4-Year Plan should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110	3	COMM 110	3
HD&E 189	1	ENGL 120	3
Humanities/Fine Arts	3	HDFS 135	3
PSYC 111	3	Science/Technology	3
Quantitative Reasoning	3	SOC 110	3
HNES 110*	3		
	16		15
Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
Humanities/Fine Arts	3	HNES 341*	3
Science/Technology w/Lab	4	PSYC 210	3
Elective	3	PSYC 250 or HDFS 230	3
	16		15
Junior			
Fall	Credits	Spring	Credits
HNES 367*	3	EDUC 489	3
PSYC 212	3	ENGL 358	3
Science/Technology	3	HNES 345*	3
Elective	3	Elective	3
Elective	4	Elective	3
	16		15
Senior			
Fall	Credits	Spring	Credits
EDUC 451	3	EDUC 485	1
EDUC 481 (HE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3

HNES 445*	3	
HD&E 320	1	
Elective	3	
	16	13

Total Credits: 122

* Students must earn a "B" or better in all courses identified with an asterisk (*).

Teaching Specialty - History

Major Requirements

Major: History Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
HIST 390	Historical Research and Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3

Science & Technology (S):

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. Select from current general education list 10

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

Major Requirements

General Education Requirements 40

History 100-200 Level Courses 9

History 300-400 Level Courses

HIST 390	Historical Research and Writing	3
HIST 489	Senior Seminar (Capstone) Prerequisite HIST 390	3
HIST	300-400 level courses	9

Distribution Requirement: Select 6 credits from each of the 3 categories. 18

North American History (6 cr):

HIST 382	Canada	
HIST 421	U.S. History 1763-1829	
HIST 422	U.S. History 1829-1917 I	
HIST 423	U.S. History 1829-1917 II	
HIST 424	U.S. History 1917-Present I	
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 476		
HIST 429		
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	
Widening Horizons (6 cr):		
HIST 381	Australia & New Zealand	
HIST 440	The Ottoman Empire	
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America 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	

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**122****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.
- Courses taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

Teaching Specialty - Mathematics

Major Requirements

Major: Mathematics Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing. Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		41
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Major Requirements

A grade of 'C' or better is required in all Teaching Specialty requirement courses and the Professional Education requirement courses.

General Education Requirements		40
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Teaching Specialty Requirements

CSCI 160	Computer Science I	4
MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 270	Introduction to Abstract Mathematics	3
MATH 374	Special Problems In Mathematics	1
MATH 420	Abstract Algebra I	3
MATH 429	Linear Algebra	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 two 300-400 level MATH courses approved by the department. MATH 266 may be used as one of these electives.		6
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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
Degree Requirements: Potential of a minimum of 7 credits to reach 122		7
Total Credits		122

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.
- See School of Education (<https://www.ndsu.edu/education>) for admission requirements.

*If double majoring in mathematics and mathematics education, take STAT 467 Probability and Mathematical Statistics I and STAT 468 Probability and Mathematical Statistics II in place of STAT 367/368. And MATH 421 Abstract Algebra II and MATH 451 Real Analysis II should be taken as electives.

Teaching Specialty - Music (Instrumental)

Major Requirements

Major: Music Education - Instrumental Music Track

Degree Type: B.Mus

Required Degree Credits to Graduate: 143

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 322	Writing and the Creative Process	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		10
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. Select from current general education list.		
Humanities & Fine Arts (A):		
MUSC 103	Introduction to Music History	3
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

Major 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 grade of 'C' or better is required in all MUSC prefix courses.

Code	Title	Credits
General Education Requirements		40
Music Core Requirements for Education Majors		54
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 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 & Techniques	2
or MUSC 358	Jazz Methods	
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		28
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		24
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 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 304	University Symphony Orchestra	
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
Performance Attendance: Must enroll in the following for 5 different semesters:		
MUSC 180	Performance Attendance	0
Applied Major Instrument: All students enrolled in applied instruction must participate in a major ensemble specific to their area. Select from the following:		7
MUSC 165	Applied Piano	
MUSC 168	Applied Wind Instruments	
MUSC 169	Applied Percussion Instruments	
MUSC 170	Applied Upper Strings	
MUSC 171	Applied Lower Strings	
MUSC 172	Applied Guitar	
2 semesters each of 100 level, 200 level, and 300 level		
One semester of 400 level		
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	

Total Credits**143****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.

Teaching Specialty - Music (Vocal)**Major Requirements****Major: Music Education - Vocal Music Track**

Degree Type: B.Mus

Required Degree Credits to Graduate: 139

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
or ENGL 322	Writing and the Creative Process	

COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A):		
MUSC 103	Introduction to Music History	3
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		40

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
General Education Requirements		40
Music Core Requirements for Education Majors		54
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 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	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		28
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		22
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 311	Jazz Ensemble	
Performance Attendance: Must enroll for 5 different semesters		
MUSC 180	Performance Attendance	0
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 **139**

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.

Teaching Specialty - Physical Education

Major Requirements

Major: Physical Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S): Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
Wellness (W):		
HNES 217	Personal and Community Health *	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and proficiency at the second year in a modern foreign language are required. See School of Education for admission requirements.

Major Requirements

Code	Title	Credits
General Education Requirements		40
Teaching Speciality Requirements		
HDFS 230 or PSYC 250	Life Span Development Developmental Psychology	3
HNES 110	Introduction to Health and Physical Education *	3
HNES 154	Professional Preparation in Elementary School Activities *	3
HNES 254	Curriculum, Standards and Assessment in Physical Education *	3
HNES 255	Professional Preparation in Middle School Physical Education *	3
HNES 256	Professional Preparation in High School Physical Education *	3
HNES 301	Motor Learning and Performance *	3
HNES 336	Methods Of Coaching *	3
HNES 350	Fitness Education Activities and Materials *	3
HNES 353	Adapted Physical Education *	3
HNES 367	Principles of Conditioning *	3
HNES 461	Administrative and Social Aspects of Physical Education and Athletics *	3
College Requirement		
HD&E 320	Professional Issues	1
Physical 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: (PE)	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
Degree Requirement: Potential of 13 credits to reach 122		13
Total Credits		122

* Students must earn a grade of 'B' or better.

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 the professional education requirements, as well as passing the Exit Portfolio, 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.

PHYSICAL EDUCATION TEACHING MAJOR

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four-year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The 4-Year Plan should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110	3	ENGL 120	3
HD&E 189	1	COMM 110	3
HNES 110*	3	HNES 255*	3
Humanities/Fine Arts	3	Science/Technology	3
PSYC 111	3	SOC 110	3
Quantitative Reasoning	3		
	16		15
Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	EDUC 322	3
HNES 100 & HNES 111 & HNES 217*	2-3	HNES 154*	3
HNES 254*	3	PSYC 250 or HDFS 230	3
HNES 256*	3	Science/Technology	3
Science/Technology w/Lab	4	Elective	3
	15-16		15
Junior			
Fall	Credits	Spring	Credits
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3
HNES 336*	3	HNES 350*	3
HNES 367*	3	Humanities/Fine Arts	3
Elective	3	Elective	3
	15		15
Senior			
Fall	Credits	Spring	Credits
EDUC 481 (PE)	3	EDUC 485	1

EDUC 486	3	EDUC 487	9
HD&E 320	1	EDUC 488	3
HNES 461*	3		
Elective - As needed to reach 122 credits.	8		
	18		13

Total Credits: 122-123

* Students must earn a "B" or better in all courses identified with an asterisk (*).

Teaching Specialty - Physics

Major Requirements

Major: Physics Education

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

Required Degree Credits to Graduate: 148

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 124 & 124L	Environmental Science and Environmental Science Laboratory	4
CHEM 150 or CHEM 121	Principles of Chemistry I General Chemistry I	3
CHEM 151 or CHEM 122	Principles of Chemistry II General Chemistry II	3

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G):

GEOL 105	Physical Geology	3
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Total Credits 40

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and proficiency at the second year in a modern foreign language are required.

Major Requirements

General Education Requirements 40

Teaching Specialty Requirements

CHEM 160 or CHEM 121L	Principles of Chemistry Laboratory I General Chemistry I Laboratory	1
CHEM 161 or CHEM 122L	Principles of Chemistry Laboratory II General Chemistry II Laboratory	1

CHEM Elective	300/400-Level Elective Course & Lab	4
CSCI 114 or CSCI 116 or CSCI 160	Microcomputer Packages Business Use of Computers Computer Science I	3-4
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
MATH 129	Basic Linear Algebra *	2
MATH 165	Calculus I	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 215	Research For Undergraduates	1
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 251R	University Physics I Recitation	1
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
PHYS 252R	University Physics II Recitation	1
PHYS Elective	300/400-Level Elective Course	3
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361 or PHYS 370: Electromagnetic Theory	Electromagnetic Theory	3-4
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
PHYS 455 or PHYS 330: Intermediate Mechanics	Classical Mechanics	3-4
PHYS 462	Heat & Thermodynamics	3
PHYS 485	Quantum Mechanics I	3
PHYS 491	Seminar	1
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 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		148-151

* MATH 429 Linear Algebra may substitute for MATH 129 Basic Linear Algebra.

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 the professional education requirements as well as passing the appropriate Praxis II exam are required to exit the program. A grade of 'C' or better is required in all Professional Education Requirement courses.
- 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.

Teaching Specialty - Social Sciences

Major Requirements

Major: Social Science Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
HIST 390	Historical Research and Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A):

HIST 101	Western Civilization I	3
HIST 102	Western Civilization II	3

Social & Behavioral Sciences (B):

The 6 credits required in the Social & Behavioral Sciences category will be satisfied by completed the requirement for the teaching specialty.		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits		40
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Major Requirements

General Education Requirements		40
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Teaching Specialty Requirements

HIST 101	Western Civilization I (includes)	3
HIST 102	Western Civilization II (includes)	3
HIST 103	U.S. to 1877	3
HIST 104	U.S. Since 1877	3
HIST	Non-US History (300-400 level)	6
HIST	US History (300-400 level)	6
HIST	History Elective	6

Select one of the following areas (A-C):		6-9
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A. Anthropology (6 cr):

ANTH 111	Introduction to Anthropology	
ANTH	300-400 Level	

B. Sociology (6 cr):

SOC 110	Introduction to Sociology	
SOC	300-400 Level	

C. Psychology (9 cr):

PSYC 111	Introduction to Psychology	
PSYC 250	Developmental Psychology	
PSYC	300-400 Level	

Select two of the following areas (D-F):

24

D. Political Science (12 cr):	
POLS 115	American Government
POLS 420	Political Behavior-Executive-Legislative Process
POLS 422	State and Local Politics
POLS	200-400 Level (3 cr)
E. Geography (12 cr):	
GEOG 262	Geography of North America
GEOG	Electives (9 cr)
F. Economics (12 cr):	
ECON 201	Principles of Microeconomics
ECON 202	Principles of Macroeconomics
ECON	Electives (6 cr)

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
Degree Requirements: Potential of 3 credits to credits to reach 122		3

Total Credits**122-125****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.

Teaching Specialty - Spanish**Major Requirements****Major: Spanish Education**

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

Required Degree Credits to Graduate: 122

General Education Requirements**First Year Experience (F):**

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
SPAN 401	Advanced Spanish Grammar and Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list 3**Science & Technology (S):**

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. Select from current general education list	10
Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B): Select from current general education list	6
Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	40

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.

General Education Requirements	40
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	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

Degree Requirements: Potential of a minimum of 14 credits to reach 122

14

Total Credits

122-136

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.

Great Plains Institute of Food Safety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Food Safety

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200 or CFS 210	Introduction to Food Systems Introduction to Food Science and Technology	2-3
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3
Supporting Courses		
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	3-4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Degree Requirements: Potential of a minimum of 36 credits to reach 128.		36
Total Credits		128-135

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 7 credits from the following:		7
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	
COMM 486		
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 461	Business Continuity and Crisis Management	
HNES 141	Food Sanitation	
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
MICR 453	Food Microbiology	
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	

MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
SAFE/COMM 485	Risk and Crisis Communication

Total Credits**16****Minor Requirements and Notes:**

- A minimum of 8 credits must be taken at NDSU

Gerontology

Gerontology

A minor in Gerontology is sponsored through the College of Human Development and Education (<https://www.ndsu.edu/hde>) 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. There are six basic areas of study. Students should follow the directions provided for each of the areas.

Minor Requirements

Gerontology Minor

Minor Requirements

Required Credits: 19

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		
HDFS 182	Wellness and Aging	3
Area Four: Macrosystems		
Select one from the following:		3
HDFS 481	Gender and Aging	
HDFS 482	Family Dynamics of Aging	
Area Five: Internship/Practicum		
A minimum of 4 credits is required for area five.		4
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 481	Gender and Aging (the course not used for Area Four: Macrosystems may be used as an elective)	
or HDFS 482	Family Dynamics of Aging	

Total Credits**19**

Minor Requirements and Notes

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

Department of Health, Nutrition, and Exercise Sciences

www.ndsu.edu/hnes

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, physical education, sport, athletic training (see Graduate bulletin (p. 593)), and dietetics. Undergraduate majors are available in Dietetics, Exercise Science, Health Education, Physical Education, and Sport Management.

Dietetics (p. 431)

Exercise Science (p. 435)

Health Education (p. 409)

Physical Education (p.)

Sport Management (p. 446)

Dietetics

Dietetics Major

There are two options within the Dietetics major: (a) Dietitian Education Program and (b) Didactic Program. Both programs include all didactic courses required to be accredited by the The Academy of Nutrition and Dietetics. Only graduates of ACEND-accredited programs are eligible to take the exam to become a Registered Dietitian Nutritionist (RDN) or Nutrition and Dietetics Technician, Registered (NDTR).

Students with a major in Dietetics are employed in many settings such as hospitals, clinics, community health programs, businesses, industries, school food services, and as consultants in homes for the elderly and other service institutions. Research and development opportunities are available in industry, government, and universities; in regulation of food quality through government agencies; and within companies as communication specialists.

Note: *Transfer credits in dietetics or food and nutrition from other institutions must have grades of 'C' or better to be accepted for the Dietetics program at NDSU.*

Dietitian Education Program (DEP) Option

This option prepares professional dietetic practitioners for work in entry-level positions in hospitals, nursing homes, out-patient clinics, businesses, and community agencies. Students in the Dietitian Education Program will complete 1,200 supervised practice hours as part of the undergraduate curriculum allowing them to take the registration examination upon graduation. The Dietitian Education Program has a gerontology concentration to train students on the health concerns of the aging population.

Didactic Program in Dietetics (DPD) Option

This option meets the requirements for entrance into an accredited dietetic internship and prepares graduates for internships in hospitals, as well as in health care related organizations. After earning the BS in dietetics, graduates will need to complete the 1200 supervised practice hours (internship) in order to be eligible to take the registration exam for dietitians.

Acceptance into either Dietetics program is competitive and enrollment is limited. Students who have completed the prerequisite courses apply for admission in February. The Accreditation Council for Education in Nutrition and Dietetics (ACEND) accredits both program options.

Major Requirements

Major: Dietetics Option: Dietitian Education Program with Gerontology Concentration (DEP) Option: Didactic Program in Dietetics (DPD)

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189

Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)

Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 320	Business and Professional Writing	
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	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
BIOL 220	Human Anatomy and Physiology I	3
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
MICR 202 & 202L	Introductory Microbiology and Introductory Microbiology Lab	3
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
ECON 105	Elements of Economics	3
Wellness (W):		
HNES 250	Nutrition Science (grade of 'B' required)	3
Cultural Diversity (D):		
ANTH 111	Introduction to Anthropology	3
Global Perspectives (G):		
ECON 105	Elements of Economics	3
Total Credits		41

Major Requirements

A grade of "C" or better is required in all HNES courses.

General Education Requirements		40
Dietetics Core Requirements		
ANTH 111	Introduction to Anthropology	3
BIOL 221	Human Anatomy and Physiology II	3
CHEM 240	Survey of Organic Chemistry	3
CHEM 260	Elements of Biochemistry	4
HNES 141	Food Sanitation	1
HNES 251	Nutrition, Growth and Development	3
HNES 260	Athletic Training Medical Terminology	1
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	5
HNES 452	Nutrition, Health and Aging	3
HNES 458	Advanced Medical Nutrition Therapy	4
HNES 460	Foodservice Systems Management II	3

MATH 103	College Algebra	3
or MATH 104	Finite Mathematics	
PSYC 211	Introduction To Behavior Modification	3
or PSYC 280	Introduction to Health Psychology	

Select one of the following Dietetics Options listed below to complete the major: 5-23

Dietitian Education Program (DEP) - 23 credits

Didactic Program in Dietetics (DPD) - 5 credits

Degree Requirements: Potential of 17 credits to reach 122 17

Total Credits 122-123

Dietitian Education Program (DEP)

HNES 354L	Introduction to Medical Nutrition Therapy Laboratory	2
HNES 458L	Advanced Medical Nutrition Therapy Laboratory	3
HNES 460L	Foodservice Systems Management II Laboratory	3
HNES 480	Dietetics Practicum (Capstone Experience)	12
HNES 400	Interprofessional Health Care Practice	3

Total Credits 23

Didactic Program in Dietetics (DPD)

HNES 481	Dietetics: Capstone Course for DPD	1
HNES 491	Seminar	1
HNES 400	Interprofessional Health Care Practice	3

Total Credits 5

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 BIOL 220, BIOL 221, CHEM 121/L, CHEM 240, CHEM 260, HNES 250, MICR 202/L)
- A grade of 'C' or better is required for all required science courses (BIOL 220, BIOL 221, CHEM 121/L, CHEM 240, CHEM 260, MICR 202/L)
- A grade of 'B' or better is required for HNES 250 - Nutrition Science
- SOC 110 Introduction to Sociology and a cultural diversity may be substituted for ANTH 111 Introduction to Anthropology.

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four-year span. The arrangement of courses is based on which semester the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The Plan of Study should be used with the curriculum guide. Remember, this only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ANTH 111*	3	Humanities	3
CHEM 121	3	ECON 105	3
CHEM 121L	1	ENGL 120	3
ENGL 110 (Includes ENGL 100 lab for 1 credit or placement)	3	HNES 141	1
HD&E 189	1	MICR 202	2
MATH 103 or 104**	3	MICR 202L	1
		PSYC 111	3
	14		16
Sophomore			
Fall	Credits	Spring	Credits
BIOL 220	3	Applications are due for the DEP and DPD program on February 1.	
CHEM 240	3	BIOL 221	3

COMM 110	3	CHEM 260	4
HNES 250	3	HNES 251	3
HNES 291	1	PSYC 211 or 280	3
Humanities	3	STAT 330	3
	16		16

Junior			
Fall	Credits	Spring	Credits
HNES 261	3	HNES 260	1
HNES 261L	2	HNES 354	4
HNES 351	4	HNES 354L	2
HNES 442	3	HNES 361	3
HNES 442L	2	HNES 361L	3
HNES 452	3	HNES 400	3
	17		16

Senior			
Fall	Credits	Spring	Credits
Upper Division Writing ***	3	HNES 480	12
HNES 458	4		
HNES 460	3		
HNES 460L	3		
HNES 458L	3		
	16		12

Total Credits: 123

* SOC 110 and Cultural Diversity may be substituted for ANTH 111.

** If the "Pre-calculus Math Placement Test" indicates MATH 105 or higher, student may select an elective in place MATH 103 or Math 104.

*** Upper-Division Writing may include: ENGL 320, 324, 325, 358, or 459.

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four-year span. The arrangement of courses is based on which semester the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The Plan of Study should be used with the curriculum guide. Remember, this only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ANTH 111*	3	Humanities	3
CHEM 121	3	ECON 105	3
CHEM 121L	1	ENGL 120	3
ENGL 110 (Includes ENGL 100 lab for 1 credit or placement)	3	HNES 141	1
HD&E 189	1	MICR 202	2
MATH 103 or 104**	3	MICR 202L	1
		PSYC 111	3
	14		16

Sophomore			
Fall	Credits	Spring	Credits
BIOL 220	3	Applications are due for the DEP and DPD program on February 1.	

CHEM 240	3	BIOL 221	3
COMM 110	3	CHEM 260	4
HNES 250	3	HNES 251	3
HNES 291	1	PSYC 211 or 280	3
Humanities	3	STAT 330	3
	16		16

Junior			
Fall	Credits	Spring	Credits
HNES 261	3	HNES 260	1
HNES 261L	2	HNES 354	4
HNES 351	4	HNES 361	3
HNES 442	3	HNES 361L	3
HNES 442L	2	HNES 400	3
HNES 452	3		
	17		14

Senior			
Fall	Credits	Spring	Credits
Upper Division Writing***	3	HNES 481	1
HNES 458	4	Elective	14
HNES 460	3		
HNES 491	1		
Elective	3		
	14		15

Total Credits: 122

* SOC 110 and Cultural Diversity may be substituted for ANTH 111.

** If the "Pre-calculus Math Placement Test" indicates MATH 105 or higher, student may select an elective in place MATH 103 or Math 104.

*** Upper-Division Writing may include: ENGL 320, 324, 325, 358, or 459.

Exercise Science

Exercise Science Major

The Exercise Science major is accredited by the Commission on Accreditation of Allied Health Education Programs and endorsed by the American College of Sports Medicine. This curriculum covers the knowledge, skills, and abilities expected of an ACSM Certified Exercise Physiologist.

The Exercise Science major is designed to prepare students for entry-level positions in any of four health fitness settings: commercial, community, corporate, and clinical. Completion of the major will also 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, and other allied health professions.

The Exercise Science program includes a wide range of content from the study of physical activity and the associated acute and chronic physiological adaptations and responses to it, to health-fitness business management principles found in facilities worldwide. Majors are encouraged to select a minor in business, psychology, or other areas depending on their interests. Field experiences and a semester-long internship experience completed at the end of the Exercise Science major afford the student an opportunity to select an area of specialization in the field from sites available throughout the country.

Students are encouraged to pursue appropriate professional certification from the American College of Sports Medicine, The National Strength and Conditioning Association, or The American Council on Exercise.

Pre-Professional/Professional Emphasis

Students are admitted to the Pre-Professional emphasis in Exercise Science when declaring the major. The Pre-Professional emphasis encompasses the freshman year and fall semester of the sophomore year; transfer students are also placed in the Pre-Professional emphasis upon acceptance to the

university. Entrance into the Professional Emphasis occurs during the third semester of attendance for students who entered as freshmen; for transfer students, entrance occurs after the first semester of attendance.

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

Retention Standards

Students must meet the following retention standards (per semester) in order to maintain their status in the Exercise Science professional phase.

1. No more than two 'C' and no 'D' or 'F' grades may be earned in Exercise Science major classes.
2. Maintain a NDSU cumulative GPA of 3.00 on a 4.00 scale.

Exercise Science Major/Master of Athletic Training Program

Students who wish to attend NDSU for athletic training are advised to pursue this five-year program. The students will major in Exercise Science for their undergraduate degree and apply to the Master of Athletic Training (MATrg) graduate program to complete this program. Upon completion, the graduates will be able to take the Board of Certification (BOC) exam, earn the ATC credential and pursue employment as an athletic trainer.

Major Requirements

Major: Exercise Science

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course Upper Level Writing. Select from current general education list.		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 220 & 220L	Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	4
CHEM 121	General Chemistry I *	3
CSCI 114 or CSCI 116	Microcomputer Packages Business Use of Computers	3-4

Humanities & Fine Arts (A): Select from current general education list

6

Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology	3
PSYC 211	Introduction To Behavior Modification	3

Wellness (W):

HNES 250	Nutrition Science	3
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list**Total Credits** 41-42**Major Requirements****General Education Requirements** 40**Exercise Science Requirements**

BIOL 221 & 221L	Human Anatomy and Physiology II and Human Anatomy and Physiology II Laboratory	4
CHEM 121L	General Chemistry I Laboratory *	1
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
HNES 170	Introduction to Exercise Science *	2
HNES 210	Professional Rescuer CPR/AED and First Aid	1
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
HNES 496	Field Experience	1
PHYS 211	College Physics I	3
PHYS 211L	College Physics I Laboratory	1

Degree Requirements: Potential of 23 credits to reach 122 23**Total Credits** 122

* Requires a grade of 'B' or better.

Degree Requirements and Notes

- A cumulative GPA of 3.00 is required for graduation. No more than two grades of 'C' and no 'D' or 'F' grades may be received in 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.

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The Plan of Study should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman		
Fall	Credits Spring	Credits
ENGL 110 or 120 (ENGL 110 includes ENGL 100 lab for 1 credit or placement)	3 COMM 110	3
HD&E 189	1 CSCI 114 or 116	3-4
HNES 170	2 Humanities/Global	3

PSYC 111	3	Electives	6
Electives	6		
		15	15-16
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
HNES 210	1	HNES 368	3
PSYC 211	3	HNES 370	3
HNES 374	3	HNES 371	3
HNES 375	3	HNES 465	3
HNES 496	1	HNES 466	1
Humanities/Diversity	3	HNES 491	1
		Electives	3
		14	17
Senior			
Fall	Credits	Spring	Credits
Upper Division Writing	3	HNES 475	12
HNES 472	3		
HNES 476	2		
HNES 496	1		
Electives	8		
		17	12

Total Credits: 122-123

** Students apply for Exercise Science Professional Status during fall semester of sophomore year.

† Consult your advisor for suggested electives for certain Graduate and Professional programs.

Health Education

Health Education Major

The Health Education major emphasizes comprehensive health education and is designed to prepare students for careers in the field of school health education through the development of dispositions, knowledge and skills.

School Health Education Teaching Option

This professional teaching preparation program is designed primarily to meet the needs of those interested in a teaching career.

Teaching — School of Education

Completing the degree requirements for a health education degree in the School of Education (<https://www.ndsu.edu/education>) certifies a graduate to teach health education at the secondary level. Students may choose to enrich their background by selecting a major in physical education. It is recommended that students apply to the School of Education in the spring semester of their third year in the program.

Double Major

It is strongly recommended that Health Education teaching majors double major in Physical Education.

Physical Education Major: For further information about the physical education teaching option, please refer to the Physical Education curriculum guide (p. 442) or contact the department adviser.

Major Requirements

Major: Health Education - School Health

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
Wellness (W):		
HNES 217	Personal and Community Health *	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

Major Requirements

Code	Title	Credits
General Education Requirements		40
Teaching Specialty Requirements		
HDFS 135	Family Science **	3
HDFS 230	Life Span Development	3
or PSYC 250	Developmental Psychology	
HNES 110	Introduction to Health and Physical Education *	3
HNES 200	Principles of Nutrition *	3
or HNES 250	Nutrition Science	
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
College Requirement		
HD&E 320	Professional Issues	1
Degree Requirement: Potential of 19 credits to reach 122		19
Total Credits		122

* 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.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (w Engl 100 lab)	3	ENGL 120	3
HD&E 189	1	COMM 110	3
HNES 110*	3	HDFS 135	3
Hum/Fine Arts	3	Science/Tech	3
PSYC 111	3	SOC 110	3
Quant Reason	3		
	16		15
Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
Hum/Fine Arts	3	HNES 341*	3
Science/Tech w Lab	4	PSYC 210	3
Elective	3	PSYC 250 or HDFS 230	3
	16		15
Junior			
Fall	Credits	Spring	Credits
HNES 367*	3	EDUC 489	3
PSYC 212	3	ENGL 358	3
Science/Tech	3	HNES 345*	3
Elective	3	Elective	3

Elective	4	Elective	3
	16		15

Senior			
Fall	Credits	Spring	Credits
EDUC 451	3	EDUC 485	1
EDUC 481 (HE Section)	3	EDUC 488	3
EDUC 486	3	EDUC 487	9
HD&E 320	1		
HNES 445*	3		
Elective	3		
	16		13

Total Credits: 122

Students must earn a "B" or better in all courses identified with an asterisk ().

**Global Perspectives and Diversity requirements can be obtained through careful selection of Electives, Humanities/Fine Arts, and/or Science/Technology categories.

The following combinations of courses are suggested semester schedules that allow the student to complete the **Physical Education/Health Education double major** in a four-year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The 4-Year Plan should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (w/Eng 100 lab)	3	COMM 110	3
HD&E 189	1	ENGL 120	3
HNES 110*	3	HDFS 135	3
Humanities/Fine Arts	3	HNES 255*	3
PSYC 111	3	Science/Tech	3
Quant Reason	3	SOC 110	3
	16		18

Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
HNES 254*	3	HNES 154*	3
HNES 256*	3	HNES 341*	3
Hum/Fine Arts	3	PSYC 210	3
Science/Tech w lab	4	Science/Tech	3
	19		18

Junior			
Fall	Credits	Spring	Credits
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3
HNES 336*	3	HNES 345*	3
HNES 367*	3	HNES 350*	3
PSYC 212	3	HNES 353*	3

		PSYC 250 or HDFS 230	3
		15	18
Senior			
Fall	Credits	Spring	Credits
EDUC 481 (HE Section)	3	EDUC 485	1
EDUC 481 (PE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
HD&E 320	1		
HNES 445*	3		
HNES 461*	3		
		16	13
Total Credits: 133			

* Students must earn a "B" or better in all courses identified with an asterisk (*).

**Minimum 133 total credits for double major

***Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts and/or Science/Technology categories.

Physical Education

Physical Education Major

The Physical Education Teacher Education (PETE) program provides opportunities for students to become critical thinkers, creative planners, and effective practitioners.

To be successful in the field, a physical education student must like to work with people, be adequately skilled in physical activities, have a commitment to fitness, and be interested in the physical, biological and social sciences.

The PETE program emphasizes teaching and provides students with skills and techniques necessary to begin a successful career in K-12 physical education. The program is aligned with the Society of Health and Physical Educators (SHAPE America) PETE Standards. The courses are strategically structured to be sequential in nature.

Students initially take courses through the Department of Health, Nutrition, and Exercise Sciences (HNES) and complete their degree requirements through the School of Education (<https://www.ndsu.edu/education>). Application to the School of Education will occur during the student's sophomore year. Completion of the degree requirements for a physical education major in the School of Education certifies a graduate to teach physical education from kindergarten through grade 12 (K-12).

Students majoring in Physical Education will be studying the art and science of human movement, which includes classes in elementary, middle, and high school activities; motor learning, physiology and psychology of human movement; the art of teaching and motivating students; and performance-based assessment.

Students must earn a grade of 'B' or better in all core physical education courses and must maintain a minimum 2.75 cumulative grade-point average to stay in full standing in the program.

Graduates 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.

Double Major

It is strongly recommended that Physical Education students double major in Health Education (p. 438).

Major Requirements

Major: Physical Education

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 358	Writing in the Humanities and Social Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S): Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
SOC 110	Introduction to Sociology	3
Wellness (W):		
HNES 217	Personal and Community Health *	3
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

Bachelor of Arts (BA) Degree – An additional 6 credits of Humanities and Social Sciences and proficiency at the second year in a modern foreign language are required. See School of Education for admission requirements.

Major Requirements

Code	Title	Credits
General Education Requirements		40
Teaching Specialty Requirements		
HDFS 230 or PSYC 250	Life Span Development Developmental Psychology	3
HNES 110	Introduction to Health and Physical Education *	3
HNES 154	Professional Preparation in Elementary School Activities *	3
HNES 254	Curriculum, Standards and Assessment in Physical Education *	3
HNES 255	Professional Preparation in Middle School Physical Education *	3
HNES 256	Professional Preparation in High School Physical Education *	3
HNES 301	Motor Learning and Performance *	3
HNES 336	Methods Of Coaching *	3
HNES 350	Fitness Education Activities and Materials *	3
HNES 353	Adapted Physical Education *	3
HNES 367	Principles of Conditioning *	3
HNES 461	Administrative and Social Aspects of Physical Education and Athletics *	3
College Requirement		
HD&E 320	Professional Issues	1
Physical 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: (PE)	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

Degree Requirement: Potential of 13 credits to reach 122

13

Total Credits**122**

* Students must earn a grade of 'B' or better.

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 the professional education requirements, as well as passing the Exit Portfolio, 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.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (w/Engl 100 lab)	3	ENGL 120	3
HD&E 189	1	COMM 110	3
HNES 110 [*]	3	HNES 255 [*]	3
Hum/Fine Arts	3	Science/Tech	3
PSYC 111	3	SOC 110	3
Quant Reason	3		
	16		15
Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	EDUC 322	3
HNES 100, 111, or 217 [*]	2-3	HNES 154 [*]	3
HNES 254 [*]	3	PSYC 250 or HDFS 230	3
HNES 256 [*]	3	Science/Tech	3
Science/Tech w Lab	4	Elective	3
	15-16		15
Junior			
Fall	Credits	Spring	Credits
ENGL 358	3	EDUC 489	3
HNES 301 [*]	3	EDUC 451 (PE section)	3
HNES 336 [*]	3	HNES 350 [*]	3
HNES 367 [*]	3	Hum/Fine Arts	3
Elective	3	Elective	3
	15		15
Senior			
Fall	Credits	Spring	Credits
EDUC 481	3	EDUC 485	1
EDUC 486	3	EDUC 487	9
HD&E 320	1	EDUC 488	3
HNES 461 [*]	3		
Electives (as needed to reach 122 credits)	8		
	18		13
Total Credits: 122-123			

Students must earn a "B" or better in all courses identified with an asterisk ().

**Global Perspectives and Diversity requirements can be obtained through careful selection of electives, Humanities/Fine Arts, and/or Science/Technology categories.

The following combinations of courses are suggested semester schedules that allow the student to complete the **Physical Education/Health Education double major** in a four-year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The 4-Year Plan should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (w/Eng 100 lab)	3	COMM 110	3
HD&E 189	1	ENGL 120	3
HNES 110*	3	HDFS 135	3
Hum/Fine Arts	3	HNES 255*	3
PSYC 111	3	Science/Tech	3
Quant Reason	3	SOC 110	3
	16		18
Sophomore			
Fall	Credits	Spring	Credits
EDUC 321	3	HNES 200 or 250*	3
EDUC 322	3	HNES 217*	3
HNES 254*	3	HNES 154*	3
HNES 256*	3	HNES 341*	3
Hum/Fine Arts	3	PSYC 210	3
Science/Tech w lab	4	Science/Tech	3
	19		18
Junior			
Fall	Credits	Spring	Credits
ENGL 358	3	EDUC 451 (PE Section)	3
HNES 301*	3	EDUC 489	3
HNES 336*	3	HNES 345*	3
HNES 367*	3	HNES 350*	3
PSYC 212	3	HNES 353*	3
		PSYC 250 or HDFS 230	3
	15		18
Senior			
Fall	Credits	Spring	Credits
EDUC 481 (HE Section)	3	EDUC 485	1
EDUC 481 (PE Section)	3	EDUC 487	9
EDUC 486	3	EDUC 488	3
HD&E 320	1		
HNES 445*	3		
HNES 461*	3		
	16		13
Total Credits: 133			

* Students must earn a "B" or better in all courses identified with an asterisk (*).

** Minimum 133 total credits for double major

*** Global Perspectives and Diversity requirements can be obtained through careful selection of Humanities/Fine Arts, and/or Science/Technology categories.

Sport Management

Sport Management Major

The Sport Management major is designed to prepare students for careers in sport and recreation organizations. The capstone experience is a 12 credit internship that may be completed during the senior year or variable credit experiences taken throughout the program at approved local, state, regional, national or international organizations. To enhance employment prospects, undergraduate candidates in the Sport Management major are required to complete a Business Administration minor.

Students are also encouraged to participate in the Sport Management Association. This student organization meets regularly to organize and conduct professional and service events.

Pre-Professional/Professional Emphasis

Students are admitted to the Pre-Professional emphasis in Sport Management when declaring the major. The Pre-Professional emphasis encompasses the freshman year; transfer students are also placed in the Pre-Professional emphasis upon acceptance to the university. Entrance into the Professional Emphasis occurs for freshman during the second semester of attendance; for transfer students, application occurs during the first semester of attendance.

The following requirements must be met before beginning the professional emphasis (sophomore, junior and senior level courses with prefix HNES) of study:

1. Successful completion of HNES 190 Introduction to Sport Management with a grade of 'B' or better
2. Minimum NDSU GPA of 2.70 or higher

Application guidelines are provided during HNES 190 and during advising sessions with freshmen.

Retention Standards

Students must meet the following retention standards (per semester) in order to maintain their status in the Sport Management professional program:

- Maintain a "C" or higher in all HNES courses required for the major.
- Maintain an NDSU cumulative GPA of 2.70 or higher on a 4.00 scale.
- Maintain GPA requirements for the Business Administration Minor.

Major Requirements

Major: Sport Management

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 320	Business and Professional Writing	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R): Select from current general education list		3
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Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	

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. Select from current general education list 6-7

Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B):	
PSYC 111 Introduction to Psychology	3
SOC 110 Introduction to Sociology	3
Wellness (W):	
HNES 100 Concepts of Fitness & Wellness	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	40

Major Requirements

- A cumulative GPA of 2.70 or higher is required for admission to the Sport Management program.
- An NDSU GPA of 2.70 or higher must be maintained and the student must earn a grade of "C" or better within the HNES Major Requirement Courses to retain status in the professional program.

General Education Requirements	40
Major Requirements	
COMM 112 Understanding Media and Social Change	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 304 Sport Promotion and Public Relations	3
HNES 305 Legal Liability and Ethics in Sport	3
HNES 426 Sport Administration	3
HNES 431 Governance and Policy in Sport	3
HNES 436 Contemporary Issues in Sport Management	3
HNES 485 Sport Management Internship	12
Required Minor - Business Administration	
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.	24
Degree Requirements: Elective credits as needed to reach 122	16
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, Management Communication, and Web Design.	
Total Credits	122

* Requires a grade of 'B' or better.

Degree Requirements and Notes

- Course taken *Pass/Fail* will not be used to satisfy any requirements other than total credits.

The following combinations of courses are suggested semester schedules that allow the student to complete his/her major/option degree program in a four-year span. The arrangement of courses is based on which semesters the course is offered, the classification and the prerequisites or co-requisites required for successful completion of the course. The 4-Year Plan should be used with the curriculum guide. Remember, this is only a guide and circumstances may change the plan.

Freshman			
Fall	Credits	Spring	Credits
ENGL 110 (w/ Engl 100 lab)	3	COMM 110	3
HD&E 189	1	COMM 112	3
HNES 100	2	CSCI 114 or 116	3-4
PSYC 111	3	ENGL 120	3
Humanities/Fine Arts	3	HNES 190	3

Quantitative Reasoning	3		
	15		15-16
Sophomore			
Fall	Credits	Spring	Credits
ACCT 102 (Bus Minor)	3	ECON 105 (Bus Minor)	3
COMM 200	3	HNES 226	3
HNES 224	3	SOC 110	3
Humanities/Fine Arts-Diversity	3	Science/Tech w Lab	4
Science/Tech	3	Electives	3
	15		16
Junior			
Fall	Credits	Spring	Credits
HNES 305	3	HNES 304	3
HNES 431	3	HNES 436	3
HNES 485*	3	HNES 485*	3
Business Minor	3	Business Minor	3
Business Minor	3	Electives	3
	15		15
Senior			
Fall	Credits	Spring	Credits
HNES 426	3	HNES 485*	3
ENGL 320	3	Business Minor	3
HNES 485*	3	Business Minor	3
Business Minor	3	Electives	3
Electives	3	Electives as needed to reach 122 credits	4
	15		16

Total Credits: 122-123

* **HNES 485 Internship** can be taken for variable credit (depending on hours) throughout various terms, including summer, to reach a total 12 credits.

Department of Human Development and Family Science

www.ndsu.edu/hdfs

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.

Human Development and Family Science (p. 448)

Human Development and Family Science (Child Development option) & Elementary Education (p. 449) Valley City State University

Human Development and Family Science (Family Science option) & Social Work (p. 452) Minot State University

Human Development and Family Science

Human Development and Family Science Major

At the undergraduate level, the department offers a curriculum leading to a Bachelor of Science or Bachelor of Arts degree through five options: adult development and aging; child and adolescent development; family science; child development/elementary education; and family science/social work. Human Development and Family Science majors are prepared to work in a variety of areas related to children, aging adults, and families. Employment

opportunities include parent and family life educators, extension agents, child protection service professionals, financial counselors, nursing home activity directors, credit specialists, and directors of child care licensing.

Coursework provides students with an ecological approach to the study of human development and families with emphasis on the interactions of individuals, families, and the broader environmental context. Allowing students to select electives within the department to specialize in careers of interest provides flexibility.

Note: All credits in Human Development and Family Science must have grades of 'C' or better.

Adult Development and Aging Option

The Adult Development & Aging option prepares students for careers involving direct and support services for adults of various ages as well as graduate studies. A minor outside the department is required.

Child and Adolescent Development Option

This option prepares students for careers involving direct and support services for children and adolescents as well as graduate studies. A minor outside the department is required.

Family Science Option

This option allows students to take a concentration of courses in family science or family economics in preparation for careers in direct and support services for families as well as graduate studies. A minor outside the department is required.

Human Development and Family Science Minor

The Human Development and Family Science minor is especially appropriate for students majoring in the social or behavioral sciences and other students planning careers that involve work with people. The minor requires 18 credits, including HDFS 135 (Family Science), HDFS 230 (Lifespan Development), and 12 credits of HDFS electives. Of the 12 credits of electives, at least nine credits must be upper division (i.e., 300 or 400 level) and no more than three credits may be in field experience (HDFS 496).

Human Development and Family Science - Adult Development and Aging Option (p. 449)

Human Development and Family Science - Child and Adolescent Development Option (p. 449)

Human Development and Family Science - Family Science Option (p. 449)

Minor Requirements

Human Development & Family Science Minor

Minor Requirements

Required Credits: 18

Required Courses

HDFS 135	Family Science	3
HDFS 230	Life Span Development	3

Elective Courses *

HDFS	Elective	3
HDFS 300-400	Level Electives	9

Total Credits		18
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* No more than 3 credits may be a field experience, practicum, or student teaching.

Minor Requirements and Notes

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

HDFS & Elementary Education (VCSU)

HDFS & Elementary Education Dual Degree Program

The Human Development and Family Science (Child Development option) & Elementary Education program is a collaborative effort between NDSU and Valley City State University (<http://www.vcsu.edu>) (VCSU). Through this curriculum, offered on the NDSU campus, students are concurrently enrolled in both universities, culminating in a bachelor's degree from NDSU in Human Development and Family Science (Child Development option) as well as a bachelor's degree from VCSU in Elementary Education. 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 and helps future teachers understand development and its diversity, making them more effective teachers and helping them work with children from a wide variety of backgrounds.

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.

Required Degree Credits to Graduate: 126

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 104	Finite Mathematics	3
Science & Technology (S):		
BIOL		3
CHEM or PHYS		3
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
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. Select from current general education list		1
Humanities & Fine Arts (A):		
HIST 103	U.S. to 1877	3
or HIST 104	U.S. Since 1877	
Select from current general education list		3
Social & Behavioral Sciences (B):		
PSYC 111	Introduction to Psychology	3
PSYC 250	Developmental Psychology	3
Wellness (W):		
HDFS 242	Couples, Marriages and Families	3
Cultural Diversity (D):		
HDFS 475	Children and Families Across Cultures	3
Global Perspectives (G):		
GEOL 105	Physical Geology	3
or GEOL 106	The Earth Through Time	
Total Credits		41

Major Requirements

Code	Title	Credits
General Education Requirements		40
HDFS & Elementary Education Requirements		
HDFS 110	Introduction to Human Development and Family Science	1
HDFS 135	Family Science	3

HDFS 250	Introduction to Research Methods in Human Development and Family Sciences	3
HDFS 330	Child Development	3
HDFS 475	Children and Families Across Cultures	3
EDUC 210	Creative Activities	2
EDUC 240	Educating Exceptional Students	2
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.)	3
& HDFS 496	Field Experience (1 cr.)	
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.)	11
& HDFS 496	Field Experience (1 cr.)	
HDFS Electives: (Cannot take HDFS 230 or HDFS 496)		
HDFS	Elective	3
HDFS	300-400 level	6
Other Elementary Education Requirements		
CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
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
College Requirement		
HD&E 320	Professional Issues	1

Total Credits**126-127**

Degree Requirements and Notes

- A grade of 'C' or better is required for all HDFS courses for graduation.
- 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.
- 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.

Plan of Study Grid

				Freshman
	Fall	Credits	Spring	Credits
HD&E 189		1 ENGL 120		3
ENGL 110		3 MATH 104		3
Science/Tech Gen Ed		3 CSCI 114 or 116		3-4
ENGL 100		1 HIST 103 or 104		3
PSYC 111		3 PSYC 250		3
COMM 110		3		

HDFS 110	1					
HDFS 135	3					
	17				15-16	
						Sophomore
	Fall	Credits	Spring	Credits		
Science/Tech Gen Ed		3	HDFS 250	3		
Matching Science Gen Ed Lat		1	HDFS 330	3		
Humanities/Fine Arts Gen Ed		3	HDFS 300-400 level elective	3		
HDFS 242		3	EDUC 250 Intro to Ed	3		
HDFS elective ^{any level}		3	EDUC 283 Understanding Cultural Diversity	3		
HDFS 300-400 level elective		3				
		16		15		
						Junior
	Fall	Credits	Spring	Credits	Summer	Credits
HDFS 475		3	HD&E 320	1	EDUC 210 Creative Activities	2
Science/Tech Gen Ed		3	Directed Elective	2-3	Directed Electives	0-3
EDUC 300 Ed. Tech		2	EDUC 315 Math Methods	3		
EDUC 240 Exceptional Student		2	EDUC 320 Social Studies Met	3		
Math 277 Math for Elem I		3	EDUC 321 Foundation of Reading	3		
EDUC 352 Culturally Diverse		1	EDUC 330 Children's Literature	3		
Geography		2	EDUC 450 Assessment and Ed Issues	2		
			Math 278 Math for Elem II	2		
		16		19-20		2-5
						Senior
	Fall	Credits	Spring	Credits		
ENGL 325 or 358 or 459		3	EDUC 400 Ed Psych	2		
EDUC 322 Language Arts Me		3	EDUC 490 Student Teaching	10		
EDUC 323 Reading Methods		2	HDFS 496 (automatic enrollment) ^{The registrar will automatically enroll students during student teaching semester}	1		
EDUC 350 Elem. Practicum		2	EDUC 491 (Senior portfolio may be taken in fall or spring of senior year)	1		
EDUC 355 Science Methods		3				
Directed Electives		3-6				
		16-19		14		

Total Credits: 130-138

HDFS & Social Work (MiSU)

Human Development and Family Science & Social Work Dual Degree Program

The dual-degree program in Social Work and Human Development/Family Science is a collaborative effort between NDSU and Minot State University (<https://www.minotstateu.edu>) (MiSU). Under a cooperative agreement, students remain on the NDSU campus to complete all coursework, with MiSU courses that are specific to the social work major offered on the NDSU campus by MiSU faculty or offered through interactive video. The culmination of these requirements leads to a bachelor's degree from NDSU (Human Development and Family Science major, Family Science option) as well as a bachelor of Social Work degree from MiSU, with graduates eligible for North Dakota licensure as social workers. The curriculum combines coursework in human development and family process with coursework in social work to offer students an integrated knowledge of children, adolescents, adults, and

families across the lifespan that will equip them for careers in the helping professions as well as to address the needs and aspirations of people living in a changing world.

Major Requirements

Major at NDSU: Human Development & Family Science Major at MiSU: Social Work

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

Required Degree Credit to Graduate: 127

General Education Requirements

First Year Experience (F):

HD&E 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take HD&E 189.)	1
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Communication (C):

ENGL 110	College Composition I *	3
ENGL 120	College Composition II *	3
Select one of the following:		3
ENGL 325	Writing in the Health Professions	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics **	3
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Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	
Select one from the following: *		4
BIOL 111 & 111L	Concepts of Biology and Concepts of Biology Lab	
BIOL 126 & 126L	Human Biology and Human Biology Laboratory	
Select from current general education list		2-3

Humanities & Fine Arts (A):

PHIL 101	Introduction to Philosophy	3
or PHIL 215	Contemporary Moral Issues	
Select from current general education list		3

Social & Behavioral Sciences (B):

PSYC 111	Introduction to Psychology *	3
SOC 110	Introduction to Sociology *	3

Wellness (W):

HDFS 242	Couples, Marriages and Families	3
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Cultural Diversity (D):

HDFS 475	Children and Families Across Cultures	3
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Global Perspectives (G): Select one of the following: *

ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	

Total Credits **41**

Major Requirements

A grade of 'C' or better is better is required in all HDFS prefix courses.

General Education Requirements **40**

Human Development & Family Science Core Requirements

HDFS 110	Introduction to Human Development and Family Science	1
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HDFS 135	Family Science	3
HDFS 230	Life Span Development	3
HDFS 250	Introduction to Research Methods in Human Development and Family Sciences **	3
HDFS 341	Parent-Child Relations	3
HDFS 353	Children, Families and Public Policy **	3
HDFS 462	Methods of Family Life Education	3
HDFS 475	Children and Families Across Cultures **	3
HD&E 320	Professional Issues	1
HDFS	Elective (HDFS 196, HDFS 242 & HDFS 496 may not be used)	3
HDFS 300 or 400	Level Elective (HDFS 496 may not be used):	3
POLS 115	American Government *	3
Select one of the following: *		3
ECON 105	Elements of Economics	
ECON 201	Principles of Microeconomics	
ECON 202	Principles of Macroeconomics	
PSYC 212	Psychological Aspects of Drug Use and Abuse **	3
PSYC 270	Abnormal Psychology **	3
SWK 250	Interpersonal Skills	3
SWK 256	Development of Social Work	3
SWK 330	Behavior and Pluralistic Society	3
SWK 331	Systems Theory and 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 Semiar (to be taken in the same semester)	15
SWK 430	Diversity, Oppression, and Social Change	3
SWK Elective	Elective	3
Cultural Diversity Elective: Select one additional cultural diversity course from the NDSU general education diversity list		3
Total Credits		127

* Prerequisite for admission to the Social Work program.

** No substitutions allowed.

Degree Requirements and Notes

- 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.

Freshman		
Fall	Credits Spring	Credits
HD&E 189	1 COMM 110	3
ENGL 100	1 ENGL 120	3
ENGL 110	3 POLS 115	3
PSYC 111	3 SOC 110	3
Humanities/Fine Arts Gen Ed	3 Science/Tech Gen Ed	3
Math 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.		
HDFS 110	1	

HDFS 135	3		
	14		15
Sophomore			
Fall	Credits	Spring	Credits
BIOL 126 or 111	3	ECON 105 or 202	3
BIOL 126L or 111	1	PHIL 215 or 101	3
CSCI 114 or 116	3	HDFS 242	3
HDFS 230	3	HDFS 250	3
SWK 250 Interpersonal Skills	3	SWK 330 Human Behavior	3
SWK 256 Development of Social Well	3	SWK 331 Systems Theory & Families	3
	16		18
Junior			
Fall	Credits	Spring	Credits
PSYC 212	3	HD&E 320	1
PSYC 270	3	STAT 330	3
HDFS elective ^{any level}	3	HDFS 341	3
HDFS 300-400 level elective	3	HDFS 462	3
SWK 335 Methods I - Individuals	3	SWK 426 Methods II - Groups	3
SWK 430 Diversity, Oppression & Soc	3	SWK 499 Interprofessional Healthcar	3
	18		16
Senior			
Fall	Credits	Spring	Credits
Additional Cultural Diverse Gen Ed Course		3 SWK 490 & SWK 491 Field Education and Senior Seminar	15
ENGL 325 or 459	3		
HDFS 353	3		
HDFS 475	3		
SWK 427 Methods III - Organizations and Communities	3		
	15		15

Total Credits: 127

Wellness

Minor Requirements

Minor: Wellness

Required Credits: 18

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	Introduction to Religion
RELS 243	
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.

College of Science & Mathematics

Scott A. Wood

Minard 202, 701-231-7411, www.ndsu.edu/scimath

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. For more complete details, see the Graduate Bulletin (p. 573).

Degree Requirements

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
- Botany
- Chemistry
- Computer Science
- Geology
- Mathematics
- Natural Resources Management
- Physics
- Psychology
- Statistics
- Zoology

Minors are available in most departments.

College Requirements

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.

College General Education Requirements

College general education requirements for the two undergraduate degrees extend beyond the minimum university general education requirements (<https://www.ndsu.edu/registrar/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, HDFG, 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.

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. 45) section within the Academic Degree Information (p. 44) section of the Academic Policies (p. 32).

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 (<https://www.ndsu.edu/registrar>), 110 Ceres Hall (<https://www.ndsu.edu/alphaindex/buildings/Building::240>).

Pre-Medicine and Pre-Dentistry Programs

The suggested program will meet the requirements of most medical and dental schools with specialized advising provided for pre-professional majors including mortuary science, chiropractic, optometry, and osteopathy. In general, these requirements include organic chemistry, physics, and the equivalent of a year of general biology. Some college-level mathematics, such as MATH 146 Applied Calculus I - MATH 147 Applied Calculus II, is strongly recommended. The Bachelor of Arts degree program is recommended. 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. For further information, refer to the Interdisciplinary Programs (p. 548) section of the Bulletin.

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 (p. 463) Department and the College of Agriculture, Food Systems and Natural Resources' School of Natural Resources (p. 113) and the College of Engineering (p. 290).

Cooperative Education

Cooperative Education (<https://www.ndsu.edu/career/internshipprogram>), 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 program. See Career Center (<https://www.ndsu.edu/career>) for more information.

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences *

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.

* 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.

Interdisciplinary Programs

The following programs are interdisciplinary and are integrated with more than one college/departments within the University.

Biotechnology (p. 474)

Great Plains Institute of Food Safety (p. 494)

Natural Resources Management (p. 513)

Faculty

- Abufardeh, Sameer O., Assistant Professor of Practice of Computer Science, Ph.D., 2009, North Dakota State University
- Akhmedov, Azer, Assistant Professor of Mathematics, Ph.D., 2004, Yale University
- Aldrich-Wolfe, Laura, Adjunct Professor of Biological Sciences, Ph.D., 2006, Cornell University
- Alfonseca, Maria, Associate Professor of Mathematics, Ph.D., 2003, Universidad Autonoma de Madrid, Spain
- Anderson, Noel W., Adjunct Professor of Computer Science, Ph.D., 1988, Iowa State University
- 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
- Ayebo, Abraham, Assistant Professor of Mathematics and Education, Ph.,D., 2010, University of Nevada-Reno
- Balas, Benjamin, Assistant 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, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 2002, University of Trento, Italy
- Bierwagen, Gordon, Professor of Coatings and Polymeric Materials, Ph.D., 1968, Iowa State University
- 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
- Boudjouk, Philip, Distinguished Professor of Chemistry and Biochemistry, Ph.D., 1971, University of Wisconsin, Madison
- Bowsher, Julia H., Assistant Professor of Biological Sciences, Ph.D., 2007, Duke University
- Boyer, Jeffrey T., Assistant Professor of Practice in Instructional Technology, Ph.D., 2012, University of Florida
- Boynton, Jason, Assistant 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
- Burghaus, Uwe, Associate Professor of Chemistry and Biochemistry, Ph.D., 1995, Free University Berlin
- Butler, Leo T., Associate Professor of Mathematics, Ph.D., 2000, Queen's University, Canada
- Butler, Malcolm G., Professor of Biological Sciences, Ph.D., 1980, University of Michigan
- Calvo, Jorge, Adjunct Professor of Mathematics, Ph.D., 1998, University of California-Santa Barbara
- Carlson, Robert B., Adjunct Professor of Statistics, Ph.D., 1965, Michigan State University
- Chisholm, Bret, Adjunct Professor of Coatings and Polymeric Materials, Ph.D., 1993, University of Southern Mississippi
- Choi, Yongki, Assistant Professor of Physics, Ph.D., 2010, City University of New York
- Christensen, Warren, Assistant Professor of Physics/School of Education, Ph.D., 2007, Iowa State University
- Ciuperca, Catalin, Associate Professor of Mathematics, Ph.D., 2001, University of Kansas
- Clambey, Gary K., Associate Professor of Biological Sciences, Ph.D., 1975, Iowa State University
- Clark, Mark E., Associate Professor of Biological Sciences, Ph.D., 1996, University of Tennessee
- Colbert, Christopher, Assistant 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, Assistant 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
- Cooper, Susan M., Assistant Professor of Mathematics, Ph.D., 2005, Queen's University, Canada
- Cope, Davis, Associate Professor of Mathematics, Ph.D., 1980, Vanderbilt University
- Council, James R., Professor of Psychology; Department Chair, Ph.D., 1984, University of Connecticut
- Coykendall, James, Adjunct James A. Meier Professor of Mathematics, Ph.D., 1995, Cornell University
- Croll, Andrew, Assistant Professor of Physics, Ph.D., 2009, McMaster University, Ontario
- Croll, Stuart G., 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
- Dahl, Tami L., Senior Lecturer, M. Life Sciences, 2005, University of Maryland
- Davis, David G., Adjunct Professor of Biological Sciences, Ph.D., 1965, Washington State University
- Day, Stephanie S., Assistant Professor of Geology, Ph.D., 2012, University of Minnesota
- Degges, Ronald C., Assistant Professor of Practice of Statistics, Ph.D., 2011, North Dakota State University
- Denton, Alan R., Associate Professor of Physics, Ph.D., 1991, Cornell University
- Denton, Anne, James A. Meier Associate Professor of Computer Science and Operations Research, Ph.D., 1996, University of Mainz, Germany
- Do, Hyunsook, Associate Professor of Computer Science and Operations Research, Ph.D., 2007, University of Nebraska-Lincoln
- Dochtermann, Ned A., Assistant Professor of Biological Sciences, Ph.D., 2009, University of Nevada-Reno
- Dorfmeister, Josef, Assistant Professor of Mathematics, Ph.D., 2009, University of Minnesota
- Donohue, Keith, Lecturer of Psychology, Ph.D., 2008, Florida State University
- Duncan, Benton, Associate Professor of Mathematics; Department Chair, Ph.D., 2004, University of Nebraska-Lincoln
- Duysen, Murray E., Emeritus Professor of Biological Sciences, Ph.D., 1966, University of Nebraska
- Dvorak, Robert D., Assistant Professor of Psychology, Ph.D., 2012, University of South Dakota
- 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
- Fleming, Janet, Lecturer of Computer Science, M.B.A., Northeast Louisiana University, 1984
- Frank, Albert B., Adjunct Professor of Biological Sciences, Ph.D., 1969, North Dakota State 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
- Gammill, Robert C., Emeritus Professor of Computer Science, Ph.D., 1969, Massachusetts Institute of Technology
- 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., Assistant 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
- Gordon, Kathryn H., Associate Professor of Psychology, Ph.D., 2008, Florida State University
- Gordon, Robert, Associate Professor of Psychology and Associate Dean, Ph.D., 1999, University of Illinois at Urbana-Champaign
- Gordon, Wendy, Associate Professor of Psychology, Ph.D., 2002, University of Illinois at Urbana-Champaign
- Greenlee, Kendra J., Associate Professor of Biological Sciences, Ph.D., 2004, Arizona State University
- Greives, Timothy J., Assistant 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
- Hammond, James J., Adjunct Professor of Statistics, Ph.D., 1969, University of Nebraska
- Hammond, Richard, Adjunct Professor of Physics, Ph.D., 1979, Rensselaer 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, Assistant 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., Assistant 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., Assistant Professor of Practice of Biological Sciences, Ph.D., 2010, University of Minnesota
- Hyun, Seung Won, Assistant Professor of Statistics, Ph.D., 2010, University of Missouri
- Ihle, Thomas, Associate Professor of Physics, Ph.D., 1996, Tech. University of Aachen
- Irish, Leah A., Assistant Professor of Psychology, Ph.D., 2011, Kent State University
- Jacob, Donna L., Research Associate Professor of Biological Sciences, Ph.D., 2004, University College Dublin
- Jacobson, Denley B., Associate Professor of Chemistry and Biochemistry, Ph.D., 1984, Purdue University
- Jayaraman, Sivaguru, James A. Meier Professor of Chemistry and Biochemistry, Ph.D., 2003, Tulane University
- Jin, Wei, Assistant Professor of Computer Science, Ph.D., 2008, State University of New York at Buffalo
- Johnson, Dana L., Emeritus Senior Lecturer of Computer Science, M.S., 1980, University of Denver
- 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., Assistant 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
- Kelter, Paul, Director of the Center for Instructional Excellence and Innovation and Professor, School of Education, Ph.D., University of Nebraska
- Kenyon, Mary Jo, Senior Lecturer of Biological Sciences, M.S., 1997, North Dakota State University
- Kilina, Svetlana, Assistant 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
- Kolka, Randall, Adjunct Professor of Biological Sciences, Ph.D., 1996, University of Minnesota
- Kong, Jun, Associate Professor of Computer and Operations Research, Ph.D., 2005, University of Texas at Dallas
- Kornfeld, Isaac, Emeritus Professor of Mathematics, Ph.D., 1975, Tashkent State University, Uzbekistan
- Kotala, Pratap, Lecturer of Computer Science, M.S., 2001, North Dakota State University
- Kroll, Daniel, Emeritus Professor of Physics, Ph.D., 1973, University of Chicago
- Krush, Joan, Lecturer/Advisor of Computer Science and Operations Research, M.S., 1999, University of Iowa
- Kryjevskaja, Liudmila, Assistant Professor of Physics and School of Education, Ph.D., 2008, University of Washington
- Kryjevski, Andrei, Research Assistant Professor of Physics, Ph.D., 2004, University of Washington

- 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
- Latimer, Joseph, Lecturer of Computer Science, M.B.A., 1988, California Polytechnic State University
- Leopold, Roger A., Adjunct Professor of Biological Sciences, Ph.D., 1967, Montana State University
- Lepper, Kenneth, Associate Professor of Geology, Ph.D., 2001, Oklahoma State University
- Lewis, Adam R., Assistant Professor of Geology, Ph.D., 2005, Boston University
- Li, Juan, Associate Professor of Computer Science, Ph.D., 2008, University of British Columbia
- 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, Associate Professor of Mathematics, Ph.D., 2003, University of Illinois at Urbana-Champaign
- Ludwig, Simone, Associate Professor of Computer Science and Operations Research, Ph.D., 2004, Brunel University, United Kingdom
- Lukat-Rodgers, Gudrun, Research Associate Professor of Chemistry and Biochemistry, Ph.D., 1985, Iowa State University
- Magel, Kenneth I., Professor of Computer Science, Ph.D., 1977, Brown 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, John C., III, Associate Professor Emeritus of Computer Science, Ph.D., 1971, Rice University
- Martin, William O., 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, Associate Professor and Chair of Physics, 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., 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
- Miljkovic, Tatjana, Assistant Professor of Practice of Statistics, Ph.D., 2013, North Dakota State University
- Mitchell, James E., Adjunct Professor of Psychology, M.D., 1972, Northwestern University
- Momsen, Jennifer L., Assistant Professor of Biological Sciences, Ph.D., 2007, Rutgers University
- Montplaisir, Lisa M., Associate Professor and Associate Head of Biological Sciences, Ph.D., 2003, University of Arizona
- Morris, Melvin L., Emeritus Professor of Chemistry and Biochemistry, Ph.D., 1958, Ohio State University
- Munski, Douglas, Adjunct Professor of Geosciences, Ph.D., 1978, University of Illinois at Urbana-Champaign
- Murphy, Keith E., Professor of Biological Sciences, Ph.D., 1989, Louisiana State University
- Myronovych, Oksana, Assistant Professor of Practice of Computer Science, Ph.D., 2009, North Dakota State University
- Nawrot, Mark, James A. Meier Professor of Psychology, 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., Assistant 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, Assistant Professor of Chemistry and Education, Ph.D., expected Spring 2012, University of Minnesota
- Nygard, Kendall E., Professor of Computer Science, Ph.D., 1978, Virginia Polytechnic Institute and State University
- Oduor, Peter, Associate Professor of Geology, Ph.D., 2004, University of Missouri - Rolla
- Offerdahl, Erika, Associate Professor of Biological Sciences and School of Education, Ph.D., 2008, University of Arizona
- 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, Assistant Professor of Statistics, Ph.D., expected Spring 2012, Iowa State University
- Otte, Marinus L., Professor of Biological Sciences, Ph.D., 1991, Vrije Universiteit of Amsterdam
- Park, Ernest, Adjunct Professor of Psychology, Ph.D., 2003, Michigan State University
- Pavicic, Mark J., Adjunct Professor of Computer Science, Ph.D., 1985, Columbia University
- Perrizo, William K., University Distinguished Professor, Jordan Engberg Professor of Computer Science, Ph.D., 1972, University of Minnesota

- 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
- 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
- Rafert, J. Bruce, Professor of Physics, Ph.D., 1979, University of Florida
- 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
- Reed, Wendy L., Associate Professor of Biological Sciences, Department Head, Ph.D., 2000, Iowa State University
- Reindl, Katie M., Assistant 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., Professor of Psychology, Ph.D., 1985, University of Houston
- Routledge, Clay, Associate Professor of Psychology, Ph.D., 2005, University of Missouri-Columbia
- Rudesill, James T., Emeritus Professor of Chemistry and Biochemistry, Ph.D., 1957, Purdue University
- Saini-Eidukat, Bernhardt, Associate Professor of Geology, Ph.D., 1991, University of Minnesota
- Sather-Wagstaff, Sean, Associate Professor of Mathematics, Ph.D., 2000, University of Utah
- Sawicki, Charles A., Associate Professor Emeritus of Physics, Ph.D., 1975, Cornell University
- Schroer, Julie M., Lecturer/Advisor, M.S., 1998, North Dakota State University
- Schwert, Donald P., Professor of Geology and Interim Department Chair; Ph.D., 1978, University of Waterloo, Canada
- Scoby, Donald R., Emeritus Professor of Biological Sciences, Ph.D., 1968, North Dakota State University
- SenGupta, Indranil, Assistant 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, Assistant 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
- Sinha, Mahendra K., Emeritus Professor of Physics, Ph.D., 1961, Pennsylvania State University
- Sinha, Sangita, Assistant 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.
- Slinger, William D., Adjunct Professor of Statistics, Ph.D., 1975, Cornell University
- Slator, Brian M., Professor of Computer Science; Department Head, Ph.D., 1988, New Mexico State University
- Smith, Matthew T., Assistant 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., Associate Professor Emeritus of Chemistry and Biochemistry, Ph.D., 1972, University of South Dakota
- Srivastava, D.K., Professor of Chemistry and Biochemistry, Ph.D., 1980, Banaras Hindu University, India
- Stockwell, Craig A., James A. Meier Professor of Biological Sciences, Ph.D., 1995, University of Nevada, Reno
- Striker, Jessica, Assistant Professor of Mathematics, Ph.D., 2008, University of Minnesota
- Sugihara, James M., Emeritus Professor of Chemistry and Biochemistry, Ph.D., 1947, University of Utah
- Sun, Wenfang, 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
- Swenson, Rodney, Adjunct Professor of Psychology, Ph.D., 1985, University of North Dakota
- Swenson, Orven F., Associate Professor of Physics, Ph.D., 1982, Air Force Institute of Technology
- Tackett, Lydia S., Assistant 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
- Tang, Jingpeng, Adjunct Professor of Computer Science, Ph.D., 2002, North Dakota State University
- Thomas, Laura E., Assistant 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
- Ubhaya, Vasant A., Professor of Computer Science, Ph.D., 1971, University of California, Berkeley

- 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, Associate Professor of Coatings and Polymeric Materials, Ph.D., 1994, Lviv Polytechnic Institute, Ukraine
- Wagner, Alexander, Associate Professor of Physics, Ph.D., 1997, Oxford University
- Webster, Dean C., Professor of Coatings and Polymeric Materials, Department Chair, Ph.D., 1984, Virginia Polytechnic Institute and State University
- Wettstein, Greg, Adjunct Professor of Computer Science, Ph.D., 1988, North Dakota State University
- White, Alan R., Adjunct Professor of Biological Sciences, Ph.D., 1981, University of North Carolina
- Wilkinson, John C., Assistant 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
- Withnell, Gary D., Adjunct Professor of Physics, Ph.D., 1980, North Dakota State University
- Wittrock, David A., Professor of Psychology, Ph.D., 1990, State University of New York, Albany
- Wonderlich, Stephen A., Adjunct Professor of Psychology, Ph.D., 1985, University of Missouri
- Wood, Scott A., Dean, Ph.D., 1985, Princeton University
- Van Amburg, Gerald L., Adjunct Professor of Biological Sciences, Ph.D., 1969, Texas A&M University
- Yan, Changhui, Associate Professor of Computer Science, Ph.D., 2005, Iowa State University
- Yang, Yarong, Assistant Professor of Statistics, Ph.D., 2010, Northern Illinois University
- Zhao, Pinjing, Associate Professor of Chemistry and Biochemistry, Ph.D., 2003, Cornell University

Department of Biological Sciences

www.ndsu.edu/biology

Biological Sciences

The Department of Biological Sciences offers broad undergraduate preparation in the basic concepts and principles of the life sciences with major emphasis on both plant and animal forms. Various curricular options are available for specific career interests. It is important for students to consult frequently with their advisers regarding the proper options and 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 level. Students interested in majoring in a specific biological science (animal science, botany, entomology, horticulture, microbiology, plant pathology, or zoology) should consult the appropriate discipline.

Biological Sciences (p. 463)

Botany (p. 469)

Zoology (p. 471)

Biological Sciences

A Biological Sciences degree is available in a traditional broad-based sequence or in an Environmental Science option.

Environmental Science Option

Environmental Science is characterized by an integrative, multidisciplinary approach to environmental issues of concern to humans. This represents an exciting, rewarding area of science, which requires an especially strong academic background and an ability to think both analytically and comprehensibly.

For students interested in careers that address solving environmental problems, there is the Biological Sciences major with an Environmental option. This rigorous option incorporates balanced studies in the natural sciences (biology, chemistry, physics, and earth sciences) with social sciences (economics, political science, and sociology). It also involves technology, business, law, ethics, and human relations and behavior. Students interested in this option should visit with an adviser to obtain the specific requirements. Environmental Science students may not pursue a minor in Biology.

Biological Sciences Education and Comprehensive Science Education Majors

Students interested in Biological Sciences Education (p. 393) or Comprehensive Science Education (p. 397) are encouraged to declare a double major in the discipline and in education (i.e., Biological Sciences Education and Biological Sciences). Such double majors may be earned by successful completion of a few additional credits. Students should contact advisers in Biological Sciences for details.

Students who intend to teach life sciences in the secondary schools should make their intentions known to the School of Education and consult with a biology education adviser in the Department of Biological Sciences (<https://www.ndsu.edu/biology>) early in their programs to make certain that they have a well-designed program and take the professional education courses required for state teacher certification.

The Comprehensive Science Education major is designed to prepare the secondary general science teacher. This major is an especially good preparation for students who may find themselves teaching several different science courses. Information about curriculum and other requirements is available from the School of Education (<https://www.ndsu.edu/education>) and the education adviser in the Department of Biological Sciences. Biological Sciences Education and Comprehensive Science Education majors cannot pursue a minor in Biology.

Major Requirements

Major: Biological Sciences - Standard

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.		10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G): Select from current general education list	
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Total Credits	40
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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

General Education Requirements	40
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Science and Mathematics College Requirements	6-12
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Biological Sciences Core Requirements - Standard Option	
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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
BIOL 491	Seminar	2
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL/ZOO 364	General Ecology	3
ZOO 370	Cell Biology	3

Select one of the following: 3-4

BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 460	Plant Ecology	

Electives: Select 12 credits from the following: 12

BOT 380	Plant Physiology	
ZOO 380	Vertebrate Histology	
ZOO 460	Animal Physiology	
ZOO 464	Endocrinology	
ZOO 482	Developmental Biology	
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
ZOO 280	Comparative Chordate Morphology	
ZOO 360	Animal Behavior	
ZOO 450	Invertebrate Zoology	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
BOT 460	Plant Ecology	
BIOL 270	Antibiotic Drug Discovery	
ZOO 465	Hormones and Behavior	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	

Related Required Courses

Chemistry:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4

Math:

MATH 146	Applied Calculus I	4
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Physics:

PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4

Organic Chemistry & Biochemistry: Select one of the following groups: 7-10

Group One:

CHEM 240	Survey of Organic Chemistry	
CHEM 260	Elements of Biochemistry	
Group Two:		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
BIOC 460	Foundations of Biochemistry and Molecular Biology I	
Earth Science: Select 2 from the following:		6-8
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	
GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
Degree Requirements: Potential 15 credits to reach 122		15
Total Credits		122-134

Department Requirements

- Students may not minor in biology with this major

Major Requirements

Major: Biological Sciences - Environmental Science Option

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.		10
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Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 40

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.

General Education Requirements		40
Science and Mathematics College Requirements		6-12
Biological Sciences Core Requirements - Environmental Science Option		
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
BIOL 491	Seminar	2
BIOL 315 & 315L	Genetics and Genetics Laboratory	4
BIOL/ZOO 364	General Ecology	3
BIOL 480	Ecotoxicology	3
Select one of the following:		3-4
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 431	Intermediate Genetics	
BOT 450	Range Plants	
BOT 460	Plant Ecology	
Electives: Select 12 credits from the following:		12
BOT 380	Plant Physiology	
BOT 431	Intermediate Genetics	
ZOO 370	Cell Biology	
ZOO 380	Vertebrate Histology	
ZOO 460	Animal Physiology	
ZOO 464	Endocrinology	
ZOO 482	Developmental Biology	
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
ZOO 280	Comparative Chordate Morphology	
ZOO 360	Animal Behavior	
ZOO 450	Invertebrate Zoology	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
ZOO 458	Mammalogy	
BIOL 481	Wetland Science	
BOT 450	Range Plants	
BOT 460	Plant Ecology	
BIOL 270	Antibiotic Drug Discovery	
ZOO 465	Hormones and Behavior	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
Related Required Courses		
Earth Sciences:		
GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4

GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
SOIL 217	Introduction to Meteorology & Climatology	3
SOIL 410	Soils and Land Use	3
Chemistry:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Select one from the following:		3-5
CHEM 431 & 431L	Analytical Chemistry I and Analytical Chemistry I Laboratory	
GEOL 428	Geochemistry	
Select one of the following groups:		7-10
Group One:		
CHEM 240	Survey of Organic Chemistry	
CHEM 260	Elements of Biochemistry	
Group Two:		
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342	Organic Chemistry II	
BIOC 460	Foundations of Biochemistry and Molecular Biology I	
Math:		
MATH 146	Applied Calculus I	4
MATH 147	Applied Calculus II	4
Physics:		
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	4
Total Credits		122-134

Program notes

- Students may not minor in biology with this major

Minor Requirements

Biological Sciences Minor

Minor Requirements

Required Credits: 17

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
Select one of the following:		3-4
BOT 314	Plant Systematics	
BOT 372	Structure and Diversity of Plants and Fungi	
BOT 380	Plant Physiology	
BOT 460	Plant Ecology	
Electives	Department approved 300-400 level courses	6
Total Credits		17

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Botany and Zoology majors may not minor in Biological Sciences.

Botany

The science of botany is the study of plants including plant structure, function, systematics and ecology. Students study a wide variety of activities such as 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.

Departmental instruction is offered in the major area of Botany for students in all colleges of the university, but botany courses and instructional procedures are specially designed for undergraduate and graduate students in the College of Science and Mathematics and the College of Agriculture, Food Systems, and Natural Resources. Completion of an undergraduate major prepares the students for graduate work or for professional employment. Graduate work in Botany is offered at both the M.S. and Ph.D. levels. A minor in Botany also is available. Botany majors may not pursue a minor in Biology or Botany.

Major Requirements

Major: Botany

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.		10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	2
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Global Perspectives (G): Select from current general education list	
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Total Credits	40
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.

General Education Requirements	40
Science and Mathematics College Requirements	6-12

Botany 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
BIOL 359	Evolution	3
BOT 314	Plant Systematics	3
BOT 315 & 315L	Genetics and Genetics Laboratory	4
BOT 460	Plant Ecology	3
BOT 372	Structure and Diversity of Plants and Fungi	4
BOT 491	Seminar	2
Major Electives: Select 11 credits from the following:		11
BIOL/ZOO 364	General Ecology	
BIOL 480	Ecotoxicology	
BIOL 481	Wetland Science	
BOT 380	Plant Physiology	
BIOL 270	Antibiotic Drug Discovery	
ZOO 370	Cell Biology	
ZOO 380	Vertebrate Histology	
ZOO 460	Animal Physiology	
ZOO 464	Endocrinology	
ZOO 482	Developmental Biology	
ZOO 280	Comparative Chordate Morphology	
ZOO 360	Animal Behavior	
ZOO 452	Ichthyology	
ZOO 454	Herpetology	
ZOO 456	Ornithology	
ZOO 458	Mammalogy	
ZOO 462	Physiological Ecology	
ZOO 465	Hormones and Behavior	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	

Related Required Courses

Chemistry:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4

Organic Chemistry and Biochemistry: Select one group from the following: 7-10

Group 1:

CHEM 240	Survey of Organic Chemistry
CHEM 260	Elements of Biochemistry

Group 2:

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
BIOC 460	Foundations of Biochemistry and Molecular Biology I

Math:

MATH 146	Applied Calculus I	4
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Physics:

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
Degree Requirements: Potential of 21 credits to reach 122		21
Total Credits		122-131

Department and College Requirements

- Students may not minor in biology or botany with this major

Minor Requirements

Botany Minor

Minor Requirements

Required Credits: 19

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
BOT/BIOL 315	Genetics	3
BOT/BIOL 315L	Genetics Laboratory	1
BOT 372	Structure and Diversity of Plants and Fungi	4
Botony Elective	300-400 level	3

Total Credits **19**

Minor Requirements and Notes

- A minimum of 8 credits must be taken at NDSU.
- Botany majors may not minor in Botany or Biology.

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).

For Zoology, a grade-point average of 2.00 is required for courses taken to fulfill the 38 credits in the major. Graduate work in Zoology is offered at both the M.S. and Ph.D. levels. Zoology majors cannot pursue a minor in Biology or Zoology.

Option 1: General Zoology

This option includes elective choices that provide a broad and balanced education in Zoology from cellular and physiological mechanisms to ecological processes. This option is designed for students who wish to pursue an area not represented by the other two options or the Graduate School (<https://www.ndsu.edu/gradschool>).

Option 2: Physiology, Cell Biology, or Health Sciences

This option is designed for students who are interested in physiology or cell and molecular biology or who plan to enter professional schools (e.g., medical, osteopathic, dental, optometry, chiropractic) or graduate programs in physiology and cell biology. The emphasis is on additional course work in cell biology, physiology, chemistry, and physics.

Option 3: Fisheries, Wildlife, Ecology, and Behavior

This option is designed for students who are interested in ecology, conservation, and wildlife biology. The core courses include basic and applied ecology and electives are focused on organismal biology and ecological levels. These studies prepare the student for research or management positions with federal, state, or other agencies such as the U.S. Fish and Wildlife Service, State Game and Fish Departments, State Conservation Departments, U.S. and State Forest Services, U.S. Bureau of Land Management, Natural Resources Conservation Service, and the Environmental Protection Agency, as well as national and state parks.

A wildlife or fisheries biologist participates in a wide range of activities including natural history, systematics, aquatic and terrestrial ecology, population dynamics, management techniques, pollution biology, and public relations. Some positions require advanced training at the master's (M.S.) or doctoral

(Ph.D.) level. In addition to the curriculum suggested, at least one summer or semester of field experience is recommended. Credits for field experience may be gained either at a biological field station or through employment approved by the adviser.

Major Requirements

Major: Zoology

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.		10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G): Select from current general education list	
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Total Credits	40
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.
- A 2.00 GPA is needed in Zoology major courses; this does not include option courses.

General Education Requirements	40
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Science and Mathematics College Requirements	6-12
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Zoology 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
BIOL 359	Evolution	3
ZOO 315 & 315L	Genetics and Genetics Laboratory	4
ZOO 491	Seminar (Must be taken during student's senior year)	2

Related Required Course for all Options

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 146	Applied Calculus I	4

Zoology Option: Select one of the options (General Zoology; Physiology, Cell Biology, and Health Science; or Fisheries, Wildlife, Ecology and Behavior) listed below to complete the zoology major 27-37

General Zoology Option (min. of 30 cr.):

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
PHYS 120	Fundamentals of Physics	
ZOO 280	Comparative Chordate Morphology	
ZOO 450	Invertebrate Zoology	
ZOO/BIOL	Two courses from group one (see below)	
ZOO/BIOL	Two courses from group three (see below)	
ZOO/BIOL	One course from any group (see below)	

Physiology, Cell Biology and Health Science Option (min. of 37 cr.):

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	
CHEM 342 & 342L	Organic Chemistry II and Organic Chemistry II Laboratory	
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
ZOO 370	Cell Biology	
ZOO 460	Animal Physiology	
ZOO/BIOL	Two courses from group one (see below)	
ZOO/BIOL	Two courses from group two (see below)	
ZOO/BIOL	One course from group three (see below)	

Fisheries, Wildlife, Ecology and Behavior Option (min. of 27 cr.):

BIOL/ZOO 364	General Ecology	
CHEM 240	Survey of Organic Chemistry	
PHYS 120	Fundamentals of Physics	
ZOO 475	Conservation Biology	
ZOO/BIOL	One course from group one (see below)	
ZOO/BIOL	Two courses from group two (see below)	
ZOO/BIOL	Two Courses from group three (see below)	

Degree Requirements: Potential of 30 credits to reach 122 30

Total Credits

122-138

Option Electives

Group One

ZOO 370	Cell Biology	3
ZOO 380	Vertebrate Histology	3
ZOO 460	Animal Physiology	3
ZOO 464	Endocrinology	3
ZOO 482	Developmental Biology	3
BIOL 270	Antibiotic Drug Discovery	3
ZOO 465	Hormones and Behavior	3

Group Two

ZOO 280	Comparative Chordate Morphology	4
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ZOO 360	Animal Behavior	3
ZOO 450	Invertebrate Zoology	4
ZOO 452	Ichthyology	3
ZOO 454	Herpetology	3
ZOO 456	Ornithology	3
ZOO 458	Mammalogy	3

Group Three

BIOL/ZOO 364	General Ecology	3
BIOL 480	Ecotoxicology	3
BIOL 481	Wetland Science	3
ZOO 462	Physiological Ecology	3
ZOO 475	Conservation Biology	3
ZOO 476	Wildlife Ecology and Management	3
ZOO 477	Wildlife and Fisheries Management Techniques	3

Department Notes

- Students may not minor in biology or zoology with this major.

Minor Requirements**Zoology Minor****Minor Requirements**

Required Credits: 18

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
ZOO 315 & 315L	Genetics and Genetics Laboratory	4

Electives: At least 3 credits in department approved 300-400 level courses 6**Total Credits** 18**Minor Requirements and Notes**

- A minimum of 8 credits must be taken at NDSU.
- Zoology majors may not minor in Zoology or Biology.

Biotechnology**Biotechnology**

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. The methodologies 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 protoplasts, and the regeneration of whole plants from single cells.

Biotechnology also is concerned with the large-scale fermentation processes that utilize some of these novel organisms for the production of pharmaceuticals, diagnostic tests for diseases, feed additives, enzymes, and hormones.

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. 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 are all examples of successful biotechnology.

The Biotechnology program is offered in either the College of Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>) or the College of Science and Mathematics (<https://www.ndsu.edu/scimath>) and leads to the Bachelor of Science degree or Bachelor of Arts degree (College of Science and Mathematics only). The curriculum is designed to provide students with knowledge and experience in both basic and applied

sciences. Students have an opportunity to work with scientists in various areas including, animal science, biochemistry, biology, botany, chemistry, horticulture, microbiology, pharmaceutical sciences, plant pathology, plant science, and zoology. Faculty in each of the cooperating life-science departments has been identified to serve as advisers and research mentors for students who select the biotechnology major. Graduates of this program have excellent opportunities for employment in the biotechnology industry or for graduate education.

Students majoring in biotechnology are required to perform a research project in the laboratory of a faculty member/scientist, and to prepare a senior thesis describing their research project. A 2.50 institutional grade-point average is required to graduate from the program.

Biotechnology Minor

A minor in biotechnology requires satisfactory completion of 21 credits in the following courses. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Biotechnology

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F)		
AGRI/UNIV 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C)		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Upper Division Writing: Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 459	Researching and Writing Grants and Proposal	
MICR 354	Scientific Writing	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S)		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Select one sequence from the following:		4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from the current general education list		6
Wellness (W): Select from the current general education list		2
Cultural Diversity (D): Select from the current general education list		
Global Perspectives (G): Select from the current general education list		
Total Credits		42

Major requirements

Code	Title	Credits
General Education Requirements		40
Biotechnology Requirements		

BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 465	Principles of Physical Chemistry and Biophysics	4
BIOC 474	Methods of Recombinant DNA Technology	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
MICR 482	Bacterial Genetics & Phage	3
MICR 491	Seminar (Biotechnology)	1-5
MICR 494	Individual Study (Senior Research)	2-4
MICR 494	Individual Study (Senior Thesis)	1
Supporting Requirements		
AGRI 150	Agriculture Orientation (Applies to students earning the degree from the CoAFSNR only; Students transferring in 24 or more credits do not need to take AGRI 150)	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 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
CSCI 114 or CSCI 122	Microcomputer Packages Visual BASIC	3
Select one from the following:		8
MATH 146 & MATH 147	Applied Calculus I and Applied Calculus II	
MATH 165 & MATH 166	Calculus I and Calculus II	
Select one from the following:		4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Major Elective in Physiology: Select 3 credits from the following:		
BOT 380	Plant Physiology	3
ZOO 460	Animal Physiology	
MICR 480	Bacterial Physiology	
Major Elective in Biotechnology Technique: Select 4-6 credits from the following:		
BIOC 473	Methods of Biochemical Research	4-6
BIOC 487	Molecular Biology of Gene Expression	
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		
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.		6
Degree Requirements: Potential of 7 credits to reach 128		
7		
Total Credits		128-136

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

Biotechnology Minor

Required Credits: 21

Code	Title	Credits
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
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 form the following:		6
BOT 380	Plant Physiology	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
MICR 482	Bacterial Genetics & Phage	
PPTH 324	Introductory Plant Pathology	
ZOO 370	Cell Biology	
ZOO 460	Animal Physiology	
Total Credits		21

Minor Requirements and Notes

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

Department of Chemistry and Biochemistry

www.ndsu.edu/chemistry

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.

The department offers a B.S. and B.A. degrees in Chemistry, with several degree options, and a B.S. and B.A. degrees in Biochemistry and Molecular Biology. 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 PhD. degrees), and Biochemistry (M.S. and PhD. 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. 573).

Biochemistry and Molecular Biology (p. 478)

Chemistry (p. 480)

Biochemistry and Molecular Biology

Biochemistry and Molecular Biology Major

The Biochemistry and Molecular Biology major is designed to give students a detailed understanding of the chemistry of living matter. Careers exist in medical, pharmaceutical, food processing, and agricultural laboratories. Graduates also will have excellent preparation for graduate school or schools of medicine, dentistry, veterinary science, and business.

Biochemistry Minor

A minor in Biochemistry also is available. Contact the department (<https://www.ndsu.edu/chemistry>) for details.

Major Requirements

Major: Biochemistry & Molecular Biology

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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

General Education Requirements

Science and Mathematics College Requirements 6-12**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 465	Principles of Physical Chemistry and Biophysics *	4
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 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: 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	
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 380	Chemistry Junior Seminar	1
CHEM 431	Analytical Chemistry I	3
CHEM 491	Seminar	2
MATH 166	Calculus II	4
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
STAT 330	Introductory Statistics	3
ZOO 315	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) may count towards 3 of these credits. 9

Degree Requirements: 1 credit to reach 122 1

Total Credits 122-128

* 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**Biochemistry Minor****Minor Requirements**

Required Credits: 16

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.

Chemistry

The ACS certified Chemistry major is the basic chemistry degree designed for students seeking careers in the chemical industry, or careers in law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. Many B.S. graduates go on to M.S. or Ph.D. studies. Other degree options include a biochemistry option (also ACS certified), a polymers option (also ACS certified), a pre-professional option, and a chemistry education option.

Students may apply for scholarships available from the Department of Chemistry and Biochemistry and the Department of Coatings and Polymeric Materials (p. 483). See the College/Departmental Scholarships (<https://www.ndsu.edu/bisonconnection/finaid/scholarships>) page on the Bison Connection web site.

Pre-Professional Chemistry Option

This option is designed for students interested in medical, dental, optometry, or veterinary professional school, but who wish to have an alternative career path to careers in industry, law, government, journalism, business, etc., that would benefit from a strong background in the physical sciences and mathematics. This option also provides excellent preparation for graduate study in biochemistry, biotechnology, and molecular biology.

Polymers Option (ACS Certified)

This program is for students who wish to prepare for a career as a chemist in coatings and polymers industries, or for graduate school in polymer chemistry. This is the only program in the U.S. that combines an ACS-certified B.S. degree in Chemistry with a coatings and polymeric materials curriculum. Students have numerous opportunities to participate in the summer research and cooperative programs sponsored by the industry. Scholarship support from the Department of Coatings and Polymeric Materials (<https://www.ndsu.edu/cpm>) is available to students who elect this option.

Pre-Chemistry Education Option

This option is designed for the student interested in a disciplinary major in chemistry, but who is also considering becoming a chemistry and physics teacher. The curriculum includes physics coursework beyond the usual chemistry major to enable the graduate to teach physics in most states. For teacher certification, students must apply to the School of Education (<https://www.ndsu.edu/education>) to enroll in the additional requirements. ACS certification may be earned by taking CHEM 471 Physical Chemistry Laboratory, CHEM 429 Inorganic Chemistry Laboratory, and CHEM 432 Analytical Chemistry II/CHEM 432L Analytical Chemistry II Laboratory, as additional courses and choosing BIOC 460 Foundations of Biochemistry and Molecular Biology I instead of CHEM 260 Elements of Biochemistry.

Scholarships starting in the sophomore year are available for students in the Chemical Education option.

Major Requirements

Major: Chemistry

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
Select one of the following:		4
CHEM 150 or CHEM 160	Principles of Chemistry I Principles of Chemistry Laboratory I	
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following:		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	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		44

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.

General Education Requirements		40
Science and Mathematics College Requirements		6-12
Chemistry Core Requirements		
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		
MATH 128	Introduction to Linear Algebra	1
MATH 166	Calculus II	4
MATH 259	Multivariate Calculus	3
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5

Options: Select one of the five options listed below.

12-32

Degree Requirements: Potential of 18 credits to reach 122

18

Total Credits

122-148

Select one of the five options to complete major requirements (12-32 credits):**Option 1: ACS Certified Chemistry**

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

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

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	Coatings I and Coatings I Laboratory	5
CPM 475 & CPM 485	Coatings II and Coatings II Laboratory	5
MATH 266	Introduction to Differential Equations	3
Total Credits		27

Option 4: Pre-Professional Option

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	Introduction to Differential Equations	3

or STAT 330	Introductory Statistics	
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

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

Chemistry Minor

Minor Requirements

Required Credits: 19

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.

Department of Coatings and Polymeric Materials

www.ndsu.edu/cpm

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. Entering freshmen and transfer students apply for these scholarships through the Office of Admission. Undergraduates already enrolled at NDSU apply through the department.

While a minor is available, the Department of Coatings and Polymeric Materials does not offer an undergraduate major. Undergraduates interested in polymers and coatings are encouraged to major in Chemistry (p. 480) or Mechanical Engineering (p. 333) (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 Science and Nanotechnology.

The Coatings and Polymeric Materials minor 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 (CPM 474 Coatings I, CPM 475 Coatings II) and laboratory sequence (CPM 484 Coatings I Laboratory, CPM 485 Coatings II Laboratory) can be taken during the same academic year. Chemistry majors with the CPM minor also are required to take polymer synthesis (CPM 473 Polymer Synthesis) prior to graduation.

Minor Requirements

Coatings & Polymeric Materials Minor

Minor Requirements

Required Credits: 16

Required Courses: Select 16 credits from the following:

16

CHEM 341	Organic Chemistry I
CHEM 341L	Organic Chemistry I Laboratory
CHEM 342	Organic Chemistry II
CHEM 342L	Organic Chemistry II Laboratory
CPM 451	Laboratory, Chemical, Radiation, and Biological Safety
CPM 472	Environment and Chemical Industries
CPM 473	Polymer Synthesis
CPM 474	Coatings I
CPM 475	Coatings II
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

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU.
- If CHEM 341 Organic Chemistry I/CHEM 341L Organic Chemistry I Laboratory and CHEM 342 Organic Chemistry II/CHEM 342L Organic Chemistry II Laboratory are required for Major degree, the credits cannot also count toward a minor in Coatings and Polymeric Materials. CHEM 353 Majors Organic Chemistry Laboratory I and CHEM 354 Majors Organic Chemistry Laboratory II can be substituted for CHEM 341L Organic Chemistry I Laboratory and CHEM 342L Organic Chemistry II Laboratory.
- Chemistry majors taking CPM minor are required to have CPM 473 Polymer Synthesis.
- One CPM Laboratory Course (CPM 484 Coatings I Laboratory, CPM 485 Coatings II Laboratory, CPM 483 Polymer Practicum, CPM 487 Corrosion and Materials Laboratory)

Department of Computer Science

cs.ndsu.edu

The Department of Computer Science at NDSU offers degrees or certificates in the following undergraduate and graduate areas:

- **Bachelor of Arts:** Computer Science (web development emphasis)
- **Bachelor of Science:** Computer Science, double major in Computer Science and Mathematics, double major in Computer Science and Physics. 4+1 Bachelor's to Master's degree program.
- **Master of Science:** Computer Science, Software Engineering

- **Master of Software Engineering:** (also available as an online distance program)
- **Ph.D.:** Computer Science, Software Engineering
- **Graduate Certificate:** Digital Enterprise (e-commerce), Software Engineering

A minor in computer science is also offered.

Advisers 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. Students with some computing experience may contact the Department to arrange for an examination to receive credit for one or more of our courses (the student still registers and pays for the course, but does not have to attend or do any assignments or tests). It is possible for advanced undergraduate students to take graduate courses while completing the undergraduate program.

Graduates in computer science might choose a job in technology development, business, agriculture, industry, non-profit, education, research, or government. Their work might be in any of these areas: systems analysis, software development, security, information assurance, bioinformatics, Web development, networking, information system development, data base management, software systems, computer operating systems, game development, technical support, systems for process control, automation systems, simulation models, design and development of new computer systems, or management.

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 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 (<http://www.ndsu.edu/registrar/creditexams/ap>) may be used also.

Computer Science - BA (p. 488)

Computer Science - BS (p. 486)

Computer Science and Mathematics (p. 489)

Computer Science and Physics (p. 492)

Computer Science

Computer Science Major

The computer science undergraduate programs, based on recommendations of the Association for Computing Machinery, consist of a core of courses required for majors and a large selection of service courses and advanced courses. A grade of 'C' or better is required in all Computer Science courses. In the core, students are offered an opportunity to study concepts, applications, and implementation techniques that provide a broad practical base for both further study and a career in computing. Through a variety of service courses, every student in the university is provided an opportunity to develop computer literacy or competency. Through advanced undergraduate and graduate courses, students are offered an opportunity for in-depth study of such topics as artificial intelligence, programming languages, mobile applications, computer networks, security, information assurance, office automation, bioinformatics, software development, data mining, and data base management systems. Students are encouraged to choose elective courses from related areas including business, economics, engineering, mathematics, operations research, and statistics.

After completing part of their studies, students will find many opportunities to work part time as a research assistant to a scientist on campus, or as an intern with a local business, applying what they have learned in the classroom. Cooperative education opportunities starting in the junior year are available.

The B.A. concentrates on web development. Students receive an applied grounding in application design, web development, and deployment.

The B.S. program provides the widest exposure to computing with emphasis on high level languages, software development and advanced mathematical concepts.

Top students are encouraged to inquire about the 4+1 program providing a fast track through graduate school resulting in combined Bachelor's and Master's Degrees.

Computer Science Minor

A minor in Computer Science requires at least 17 semester hours of select computer science courses. A grade of 'C' or better is required in all courses applied toward the computer science minor.

Major Requirements

Major: Computer Science

Degree Type: B.S.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321 or ENGL 324	Writing in the Technical Professions Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

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. Select from current general education list

Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits	41
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College Requirements

Bachelor of Science Degree - An additional 6 credits in Humanities and Social Sciences*

* 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 CSCI courses.

General Education Requirements	40
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Science and Mathematics College Requirements	6
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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 for Games	3
CSCI 336	Theoretical Computer Science II	3
CSCI 366	Database Systems	3
CSCI 372	Comparative Programming Languages	3
CSCI 374	Computer Organization and Architecture	3
CSCI 415	Networking and Parallel Computation	3

CSCI 445	Software Projects Capstone *	3
CSCI 467	Algorithm Analysis	3
CSCI 474	Operating Systems Concepts	3
CSCI 489	Social Implications of Computers *	3
Computer Science Electives: Select 3 courses form the categories listed below. No more than 2 courses may come from any single category		9
Software Engineering:		
CSCI 413	Principles of Software Engineering	
CSCI 477	Object-Oriented Systems	
CSCI 488	Human-Computer Interaction	
Large Systems:		
CSCI 426	Introduction to Artificial Intelligence	
CSCI 458	Microcomputer Graphics	
CSCI 459	Foundations of Computer Networks	
Systems Modeling:		
CSCI 418	Simulation Models	
CSCI 453	Linear Programming and Network Flows	
CSCI 454	Operations Research	
Emerging Areas:		
CSCI 345	Topics on Personal Computers	
CSCI 469	Network Security	
CSCI 473	Foundations of the Digital Enterprise	
CSCI 476	Computer Forensics	
CSCI 479	Introduction to Data Mining	
Mathematics and Statistics:		
MATH 166	Calculus II	4
STAT 367	Probability	3
STAT 368	Statistics	3
Science:		
One Year Lab Science Sequence: Select one of the following sequences:		8-10
BIOL 126 & 126L & BIOL 220 & BIOL 220L	Human Biology and Human Biology Laboratory and Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory **	
CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory **	
CHEM 150 & CHEM 160 & CHEM 151 & CHEM 161	Principles of Chemistry I and Principles of Chemistry Laboratory I and Principles of Chemistry II and Principles of Chemistry Laboratory II **	
GEOL 105 & 105L & GEOL 106 & GEOL 106L	Physical Geology and Physical Geology Lab and The Earth Through Time and The Earth Through Time Lab ***	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory **	
PHYS 251 & 251L & PHYS 252 & PHYS 252L	University Physics I and University Physics I Laboratory and University Physics II and University Physics II Laboratory **	
Additional Science Course: Select one additional science course that satisfies general education requirements		3

B.S. Degree Requirements: Potential of 11 credits to reach 122	11
Total Credits	122-124

- * 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.
- ** Fulfills Gen Ed Req.
- *** Fulfills Gen Ed & Global Perspective Req.

Major Requirements

Major: Computer Science

Degree Type: B.A.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 321	Writing in the Technical Professions	3
or ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 146	Applied Calculus I	4
or MATH 165	Calculus I	

Science & Technology (S):

CSCI 114	Microcomputer Packages	3-4
or CSCI 116	Business Use of Computers	

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. Select from current general education list

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits	41-42
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College Requirements

Bachelor of Arts (BA) Degree - An additional 12 credits of Humanities and Social Sciences* and proficiency at the second year level in a modern foreign language.

* 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 CSCI courses.

General Education Requirements 40

Science and Mathematics College Requirements 12

B.A. Computer Science Core Requirements

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 for Games	3
CSCI 366	Database Systems	3
CSCI 371	Web Scripting Languages	3
CSCI 445	Software Projects Capstone *	3
CSCI 488	Human-Computer Interaction	3
CSCI 489	Social Implications of Computers *	3

Related Courses

COMM 260	Introduction to Web Design	3
COMM 261	Introduction to Web Development	3
STAT 330	Introductory Statistics	3
STAT 331	Regression Analysis	2

Other Courses: Select these seven credits from the following areas:

Science (not CSCI)		
Engineering (not ENGR 311 or ENGR 312)		
Math (higher than MATH 147, but not MATH 165)		
Statistics (not STAT 330 or STAT 331)		

B.A. Degree Requirements: Potential of 16 credits to reach 122

16

Total Credits**122**

* 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

Computer Science Minor

Minor Requirements

Required Credits: 17

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: At least 3 credits must be CSCI 300-400 level.

7

Total Credits**17-18**

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 and Mathematics

This option is available for students who wish to take advantage of the close connections between Computer Science and Mathematics.

Major Requirements

Major: Mathematics & Computer Science

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 MATH & CSCI prefix courses used toward the major.

Code	Title	Credits
General Education Requirements		40
Science and Mathematics College Requirements		6-12
Mathematics Major Requirements		
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 429	Linear Algebra	3
MATH 430	Graph Theory	3
Select one from the following:		6
MATH 420 & MATH 421	Abstract Algebra I and Abstract Algebra II	
MATH 450 & MATH 451	Real Analysis I and Real Analysis II	
MATH 491	Seminar	2
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 for Games	3
CSCI 336	Theoretical Computer Science II	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

Related Required Courses

Statistics:

STAT 367	Probability	3
STAT 368	Statistics	3

Select one from the following: 3

CSCI 418	Simulation Models	
CSCI 453	Linear Programming and Network Flows	
MATH 436	Combinatorics	
MATH 488	Numerical Analysis I	

Choose one Lecture/Lab Sequence from the following:

Sequence One:

BIOL 126 & 126L & BIOL 220 & BIOL 220L	Human Biology and Human Biology Laboratory and Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	
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Sequence Two:

CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory *	
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Sequence Three:

CHEM 150 & CHEM 160 & CHEM 151 & CHEM 161	Principles of Chemistry I and Principles of Chemistry Laboratory I and Principles of Chemistry II and Principles of Chemistry Laboratory II *	
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Sequence Four:

MICR 350 & 350L & MICR 352 & MICR 352L	General Microbiology and General Microbiology Lab and General Microbiology II and General Microbiology Lab II *	
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Sequence Five:

PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory *	
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Sequence Six:

PHYS 251 & 251L & PHYS 252 & PHYS 252L	University Physics I and University Physics I Laboratory and University Physics II and University Physics II Laboratory *	
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Potential of 3 credits to reach 122

3

Total Credits**122-128**

* Science and Technology General Education

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Computer Science and Physics

Computer Science and Physics Double Major

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.

Major Requirements

Major: Computer Science & Physics

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

Required Degree Credits to Graduate: 134

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 CSCI, PHYS, and AST prefix courses.

Code	Title	Credits
General Education Requirements		40

College of Science and Mathematics Requirements 6-12**Computer Science Major Requirements**

CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 336	Theoretical Computer Science II	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 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370: Electromagnetic Theory - MSUM)	3-4
PHYS 370	Introduction to Computational Physics	3

Select one of the following: 3-4

PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	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	Introduction to Solid State Physics	
PHYS 489	Physics Projects (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permission	

Related Required Courses

MATH 129 or MATH 429	Basic Linear Algebra Linear Algebra	2-3
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 or PHYS 489	Software Projects Capstone Physics Projects	3

Total Credits 134-143**Program Notes**

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Freshman

Fall	Credits	Spring	Credits
PHYS 171	1	PHYS 251	4
UNIV 189	1	PHYS 251L	1

MATH 165	4	PHYS 251R	1
CSCI 160	4	MATH 129	2
ENGL 110 ^{credit automatically granted if you earn a "C" in ENGL 120}	3	MATH 166	4
ENGL 120 ^{can enroll in ENGL 120 if ACT score > 17}	3	CSCI 161	4
Wellness Elective	2		
	18		16

Sophomore

Fall	Credits	Spring	Credits
PHYS 252	4	PHYS 350	3
PHYS 252L	1	MATH 266	3
PHYS 252R	1	COMM 110	3
MATH 265	4	CSCI 336	3
CSCI 213	3	Humanities/Fine Arts Elective	3
MATH 270	3	Social/Behavioral Science Elective	3
	16		18

Junior

Fall	Credits	Spring	Credits
PHYS 360	3	PHYS 370	3
PHYS 455	3	PHYS 486	3
PHYS 485	3	ENGL 324	3
CSCI 366	3	CSCI 372	3
Humanities/Fine Arts Elective	3	CSCI 374	3
	15		15

Senior

Fall	Credits	Spring	Credits
PHYS 361	3	PHYS 489	3
PHYS 462	3	PHYS 463	3
Physics Elective	3	CSCI 467	3
CSCI 474	3	CSCI 313	3
CSCI 4XX Computer Science Elective	3	or CSCI 4XX Computer Science Elective	
Social/Behavioral Science Elective	3	Humanities/Fine Arts Elective	3
		Social/Behavioral Science Elective	3
	18		18

Total Credits: 134

Great Plains Institute of Food Safety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified

around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Food Safety

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200 or CFS 210	Introduction to Food Systems Introduction to Food Science and Technology	2-3
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3
Supporting Courses		
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	3-4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4
CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Degree Requirements: Potential of a minimum of 36 credits to reach 128.		36
Total Credits		128-135

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1

SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1

Elective Courses: Select 7 credits from the following: 7

AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	
COMM 486		
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 461	Business Continuity and Crisis Management	
HNES 141	Food Sanitation	
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
MICR 453	Food Microbiology	
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
MICR 474	Epidemiology	
PLSC 110	World Food Crops	
PPTH 460	Fungal Biology	
SAFE 452	Food Laws and Regulations	
SAFE 484	Food Safety Practicum	
SAFE/COMM 485	Risk and Crisis Communication	

Total Credits

16

Minor Requirements and Notes:

- A minimum of 8 credits must be taken at NDSU

Department of Geosciences

www.ndsu.edu/geosci

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. 398) are encouraged to declare a double major in their discipline and in education (i.e., 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.

Geology (p. 498)

Environmental Geology (p. 501)

Geography (p. 501)

Geology

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.

Geology Major

Curricula requirements include a departmental core of 45 credits, including year-long sequences in calculus, chemistry, and physics, as well as computer science.

A typical first year for all geology majors includes physical geology, the Earth through time, and year-long sequences in English, mathematics, and chemistry.

Geology Minor

A minor in Geology consists of at least 18 credits of geology courses selected in consultation with a Department of Geosciences adviser. Selected geography and soil science courses may be substituted for geology courses.

Environmental Geology Minor

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. Geology majors may not minor in Environmental Geology.

Major Requirements

Major: Geology

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

The 10 credits required in the Science and Technology category will be fulfilled with requirements of the major.	10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G):

GEOL 105	Physical Geology	3
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Total Credits		41
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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

General Education Requirements	40
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Science and Mathematics College Requirements	6-12
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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
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GEOL 105 & 105L	Physical Geology and Physical Geology Lab	4
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GEOL 106 & 106L	The Earth Through Time and The Earth Through Time Lab	4
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Select one of the following:		2
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GEOL 301	Lake Superior Field Course	
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GEOL 302	Black Hills Field Course	
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GEOL 496	Field Experience	
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GEOL 350 & GEOL 303	Invertebrate Paleontology and Paleontology Field Course	4
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GEOL 410	Sedimentology/Stratigraphy	4
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GEOL 412	Geomorphology	3
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GEOL 420 & GEOL 421	Mineralogy and Mineralogy Laboratory	4
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GEOL 422	Petrology	3
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GEOL 423	Petrography	1
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GEOL 450	Field Geology	3
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GEOL 457	Structural Geology	4
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GEOL 491	Seminar (Junior Year)	1
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GEOL 491	Seminar (Senior Year)	1
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SOIL 444	Soil Genesis and Survey	3
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Related Required Courses

Chemistry: Select one of the following sequences:		8
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Sequence A:

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
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CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	
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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	
Mathematics:		
MATH 165	Calculus I	4
MATH 166	Calculus II	4
Physics: Select one of the following 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	
Skills: Select one of the following:		3-4
CSCI 122	Visual BASIC	
CSCI 160	Computer Science I	
CSCI 227	Computing Fundamentals I	
Degree Requirements: Potential of 13 credits to reach 122		13
Total Credits		122-131

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.

Geology (p. 500)

Environmental Geology (p. 501)

Geology Minor

Geology Minor

Minor Requirements

Required Credits: 18

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.

Environmental Geology

Minor Requirements

Environmental Geology Minor

Minor Requirements

Required Credits: 19-20

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
GEOL 413	Glacial Geology	3-4
or GEOL 440	Quaternary Biology	

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.

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.

Minor Requirements

Geography Minor

Minor Requirements

Required Credits: 18

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.

Department of Mathematics

www.ndsu.edu/math

Mathematics

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.

Mathematics (p. 502)

Mathematics and Computer Science (p. 505)

Mathematics and Physics (p. 507)

Mathematics and Statistics (p. 510) (includes Pre-Actuarial option)

Mathematics

The mathematics major consists of a wide variety of mathematics course that prepare students for opportunities in the workforce as well as the potential for continued graduate study in mathematics, economics, and operations research.

Major Requirements

Major: Mathematics

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
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ENGL 120	College Composition II	3
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One Course in Upper Level Writing: Select from current general education list		3
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COMM 110	Fundamentals of Public Speaking	3
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Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

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. Select from current general education list 10

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.

General Education Requirements 40

Mathematics Major Requirements

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 420 Abstract Algebra I 3

MATH 421 Abstract Algebra II 3

or MATH 451 Real Analysis II 3

MATH 429 Linear Algebra 3

MATH 450 Real Analysis I 3

MATH 491 Seminar 2

Electives 10

Must choose one course from List A & one course from List B and must include one of the pairs of courses listed here: MATH 430/MATH 436; MATH 445/MATH 446; MATH 480/MATH 483; MATH 452/MATH 481; MATH 488/MATH 489; and (MATH 420/MATH 421 or MATH 450/MATH 451: whichever you didn't choose above)

List A

MATH 374 Special Problems In Mathematics

MATH 430 Graph Theory

MATH 436 Combinatorics

MATH 440 Axiomatic Geometry

MATH 445 Differential Geometry

MATH 446 Introduction to Topology

MATH 452 Complex Analysis

MATH 472 Number Theory

List B

MATH 473 Cryptology

MATH 480 Applied Differential Equations

MATH 481 Fourier Analysis

MATH 483 Partial Differential Equations

MATH 488	Numerical Analysis I	
MATH 489	Numerical Analysis II	
STAT 467	Probability and Mathematical Statistics I	
CSCI 453	Linear Programming and Network Flows	
Related Required Courses		
CSCI 160	Computer Science I	4
Lab Science Sequence: Choose one science lecture/lab sequence (A-F) OR the CSCI 161 & 2 CSCI electives (sequence G).		
8-10		
Sequence A:		
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	
BIOL 151 & 151L	General Biology II and General Biology II Laboratory	
Sequence B:		
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	
Sequence C:		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory *	
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory *	
Sequence D:		
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 *	
Sequence E:		
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
MICR 352 & 352L	General Microbiology II and General Microbiology Lab II	
Sequence F:		
PHYS 251 & 251L	University Physics I and University Physics I Laboratory *	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory *	
or Sequence G:		
CSCI 161	Computer Science II	
Select 2 of the following:		
CSCI 345	Topics on Personal Computers	
CSCI 372	Comparative Programming Languages	
CSCI 458	Microcomputer Graphics	

Degree Requirements: Potential of a minimum of 27 credits to reach 122 27

Total Credits

122-124

* Science and Technology General Education

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements

Mathematics Minor

Minor Requirements

Required Credits: 21

Required Courses

MATH 165	Calculus I	4
MATH 166	Calculus II	4
MATH 265	Calculus III	4

Electives

Approved electives for the mathematics minor include: MATH 266, MATH 270 & all 300-400 level MATH courses except for MATH 376. 9

Total Credits

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 Computer Science

This option is available for students who wish to take advantage of the close connections between Computer Science and Mathematics.

Major Requirements

Major: Mathematics & Computer Science

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 MATH & CSCI prefix courses used toward the major.

Code	Title	Credits
General Education Requirements		40
Science and Mathematics College Requirements		6-12
Mathematics Major Requirements		
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 429	Linear Algebra	3
MATH 430	Graph Theory	3
Select one from the following:		6
MATH 420 & MATH 421	Abstract Algebra I and Abstract Algebra II	
MATH 450 & MATH 451	Real Analysis I and Real Analysis II	
MATH 491	Seminar	2
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 for Games	3
CSCI 336	Theoretical Computer Science II	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
Related Required Courses		
Statistics:		
STAT 367	Probability	3
STAT 368	Statistics	3
Select one from the following:		3
CSCI 418	Simulation Models	
CSCI 453	Linear Programming and Network Flows	
MATH 436	Combinatorics	
MATH 488	Numerical Analysis I	
Choose one Lecture/Lab Sequence from the following:		
Sequence One:		
BIOL 126 & 126L & BIOL 220 & BIOL 220L	Human Biology and Human Biology Laboratory and Human Anatomy and Physiology I and Human Anatomy and Physiology I Laboratory *	
Sequence Two:		

CHEM 121 & 121L & CHEM 122 & CHEM 122L	General Chemistry I and General Chemistry I Laboratory and General Chemistry II and General Chemistry II Laboratory *
Sequence Three:	
CHEM 150 & CHEM 160 & CHEM 151 & CHEM 161	Principles of Chemistry I and Principles of Chemistry Laboratory I and Principles of Chemistry II and Principles of Chemistry Laboratory II *
Sequence Four:	
MICR 350 & 350L & MICR 352 & MICR 352L	General Microbiology and General Microbiology Lab and General Microbiology II and General Microbiology Lab II *
Sequence Five:	
PHYS 211 & 211L & PHYS 212 & PHYS 212L	College Physics I and College Physics I Laboratory and College Physics II and College Physics II Laboratory *
Sequence Six:	
PHYS 251 & 251L & PHYS 252 & PHYS 252L	University Physics I and University Physics I Laboratory and University Physics II and University Physics II Laboratory *
Potential of 3 credits to reach 122	3
Total Credits	122-128

* Science and Technology General Education

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Mathematics and Physics

Mathematics and 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.

Major Requirements

Major: Mathematics & Physics

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

Required Degree Credits to Graduate: 132

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
College of Science and Mathematics Requirements		6-12
Mathematics Major Requirements		
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 420	Abstract Algebra I	3
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3
MATH 421 or MATH 451	Abstract Algebra II Real Analysis II	3
MATH 491	Seminar	2
Mathematics Electives	Any MATH prefix course 400-level or higher (MATH 488 & MATH 489 are recommended)	6
Physics Major Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370: Electromagnetic Theory (MSUM))	3-4
PHYS 370	Introduction to Computational Physics	3
Select one of the following:		3-4
PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 489	Physics Projects	3

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 463	Statistical Mechanics	
PHYS 481	Introduction to Solid State Physics	
MSUM AST	Astronomy courses (300/400-level) with departmental permission	

Related Required Courses

Computer Science:

CSCI 160	Computer Science I	4
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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 132-140

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Freshman

Fall	Credits	Spring	Credits
PHYS 171	1	PHYS 251	4
UNIV 189	1	PHYS 251L	1
MATH 165	4	PHYS 251R	1
CHEM 150	3	MATH 166	4
CHEM 160	1	COMM 110	3
ENGL 110 ^{credit automatically granted if you earn a "C" in ENGL 120}	3	CHEM 151	3
ENGL 120 ^{can enroll in ENGL 120 if ACT score > 17}	3	CHEM 161	1
Wellness Elective	2		
	18		17

Sophomore

Fall	Credits	Spring	Credits
PHYS 252	4	PHYS 350	3
PHYS 252L	1	MATH 266	3
PHYS 252R	1	CSCI 160	4
MATH 265	4	MATH 429	3
MATH 270	3	Humanities/Fine Arts Elective	3
Humanities/Fine Arts Elective	3	Social/Behavioral Science Elective	3
	16		19

Junior			
Fall	Credits	Spring	Credits
PHYS 360	3	PHYS 370	3
PHYS 455	3	PHYS 486	3
PHYS 485	3	ENGL 324	3
MATH 420	3	MATH 421	3
MATH 450	3	or MATH 451 Real Analysis II	
		Social/Behavioral Science Elective	3
	15		15
Senior			
Fall	Credits	Spring	Credits
PHYS 361	3	PHYS 489	3
PHYS 462	3	PHYS 463	3
Physics Elective	3	Physics Elective	3
MATH 4XX Math Elective	3	MATH 4XX Math Elective	3
Humanities/Fine Arts Elective	3	MATH 491	2
		Social/Behavioral Science Elective	3
	15		17

Total Credits: 132

Mathematics and Statistics

Mathematics and Statistics Double Major

Standard Option

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.

Major Requirements

Major: Mathematics & Statistics

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One course in Upper Level Writing: Select one course from the current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		

MATH 165	Calculus I	4
Science & Technology (S):		10
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. Select from current general education list		
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
Science and Mathematics College Requirement		6-12
Math Major Core Requirements		
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 420	Abstract Algebra I	3
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3
MATH 451	Real Analysis II	3
MATH 491	Seminar	2
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study II	1
or STAT 491	Seminar	
Statistics Electives	400 level other than those listed above	18
Related Required Courses:		
Computer Science		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Degree Requirements: Potential of 5 elective credits to reach 122		5
Total Credits		122-123

Major Requirements

Major: Mathematics & Statistics Pre-Actuarial Option

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
Science and Mathematics College Requirements		6-12
Math Major Requirements		
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 376	Actuarial Exam Study	1
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3

MATH 488	Numerical Analysis I	3
MATH 451	Real Analysis II	3
or MATH 489	Numerical Analysis II	
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study II	1
Statistics Electives	Courses must be at the 400 level and not listed above	9
Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Accounting, Business, & Economics Courses:		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	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	Money and Capital Markets	
FIN 460	Corporate Finance	
Total Credits		122-128

* Will satisfy the General Education Science & Technology category requirement.

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Natural Resources Management

With increasing human pressure and a growing need to balance competing demands, our world needs new and better ways to manage society's impacts on the environment. The Natural Resources Management program prepares students for challenging careers requiring the sustainability perspective and global social perspective necessary for examining and solving complex natural resources management problems. Our goal is the highest and best societal uses of natural resources while maintaining the integrity of life-sustaining socio-ecological systems. Career opportunities abound in federal, state and local government, the private sector, non-profit conservation and environmental organizations, as well as higher education and research.

An interdisciplinary major in NRM leads to a Bachelor of Science (B.S.) degree. Students benefit from faculty engagement from the various colleges across the university in the coordination of the program, classroom teaching and advising.

During the first four semesters of the NRM program, students complete a broad foundation of core courses in the social, biological, and physical sciences. The second half of the program offers students the opportunity to focus on a specific area of interest (emphasis). NRM offers six emphasis areas, each allowing students the flexibility to select courses for specialized career preparation.

- **Biotic Resources Science:** deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of both natural and agro-ecosystems.
- **Environmental Communication:** is designed for environmentally oriented students preparing for careers in communication fields such as journalism, public relations, broadcast media and the internet.
- **Natural Resources Economics:** prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of natural resources management and allocation.
- **Physical/Earth Resources Science:** leads to an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, energy resources and land-use management.
- **Pollution Control:** focuses on the principles and practices of managing natural resources for pollution control. Topics include the technical aspects of pollution as they relate to water, air/solids, earth/soils, and the impact of environmental pollution on biotic factors. Students interested in this emphasis are strongly urged to complete College Algebra before entering the NRM program.
- **Social Sciences:** concentrates on human factors (social, political, anthropological) in environmental management and environmental disaster management, while recognizing constraints and opportunities presented by physical and biological factors.

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 358	Writing in the Humanities and Social Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
GEOL 105	Physical Geology	3
NRM 225	Natural Resources & Agrosystems	3
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
Select one of the following:		3
POLS 110	Introduction to Political Science	
SOC 110	Introduction to Sociology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
ANTH 111	Introduction to Anthropology	

Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G):	
GEOL 105 Physical Geology	3
Total Credits	40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
NRM 150	Natural Resource Management Orientation	1
NRM/SOIL 264	Natural Resource Management Systems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
POLS 115	American Government	3
or POLS 215	Problems and Policies In American Government	
RNG 452	Geographic Information Systems in Range Survey	3
or GEOG 455	Introduction to Geographic Information Systems	
Select one of the following:		3
SOC 431	Environmental Sociology	
POLS 360	Principles of Public Administration	
POLS 422	State and Local Politics	
POLS 442	Global Policy Issues	
ANTH 462	Anthropology and the Environment	
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
SOIL 210	Introduction to Soil Science	
NRM Emphasis Area: Students must select one of the six NRM emphasis areas to complete the major. See below.		38
Degree Requirements: Potential of a minimum of 12 credits to reach 128.		12
Total Credits		123

Natural Resources Management Emphasis Areas

- Select and complete one emphasis area as part of the Natural Resources Management major.
- Declaring an Emphasis- Students should formally declare an emphasis area with the Office of Registration & Records (<https://www.ndsu.edu/registrar>) by the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Biotic Resources Science

Code	Title	Credits
Required. Select two of the following:		6
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
RNG 336	Introduction to Range Management	
RNG/NRM 453	Rangeland Resources Watershed Management	
Select a minimum of 32 credits from the approved electives list below for Biotic Resources:		32
BOT 314	Plant Systematics	

RNG 456	Range Habitat Management
SOIL 217	Introduction to Meteorology & Climatology
NRM 401	Urban-Ecosystem Management
NRM 420	Scenarios in Natural Resources Management
PLSC 219	Introduction to Prairie & Community Forestry
ZOO 470	Limnology
ZOO 476	Wildlife Ecology and Management
PLSC/BOT/ZOO 315	Genetics
PLSC/BOT/ZOO 315L	Genetics Laboratory
RNG/NRM 454	Wetland Resources Management
BOT/RNG 460	Plant Ecology
MICR 202	Introductory Microbiology
ZOO 450	Invertebrate Zoology
ZOO 454	Herpetology
ZOO 458	Mammalogy
PLSC 355	Woody Landscape Plants
RNG/BOT 450	Range Plants
BOT 380	Plant Physiology
RNG 458	Grazing Ecology
MICR 202L	Introductory Microbiology Lab
NRM 402	River and Stream Resource Management
NRM 421	Environmental Outreach Methods
ZOO 462	Physiological Ecology
ZOO 475	Conservation Biology
ZOO 477	Wildlife and Fisheries Management Techniques
ENT 350	General Entomology
ZOO 360	Animal Behavior
ZOO 452	Ichthyology
ZOO 456	Ornithology
PLSC 323	Principles of Weed Science
RNG 326	Modeling of Range and Agro-Ecosystems

Total Credits**38****Physical/earth Resources Science**

Code	Title	Credits
Required:		
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
GEOL 412 or SOIL 444	Geomorphology Soil Genesis and Survey	3
Select a minimum of 27 credits from the approved electives list below for Physical/Earth Resources Science:		27
ABEN 464	Resource Conservation and Irrigation Engineering	
ASM 354	Electricity and Electronic Applications	
RNG 336	Introduction to Range Management	
GEOL 105L	Physical Geology Lab	
GEOL 412	Geomorphology	
SOIL 444	Soil Genesis and Survey	
NRM 401	Urban-Ecosystem Management	
RNG/NRM 454	Wetland Resources Management	
NRM 420	Scenarios in Natural Resources Management	

PHYS 211	College Physics I
CE 204	Surveying
SOIL 322	Soil Fertility and Fertilizers
SOIL 410	Soils and Land Use
MICR 202	Introductory Microbiology
SOIL 465	Soil And Plant Analysis
GEOL/CHEM 428	Geochemistry
ASM 225	Computer Applications in Agricultural Systems Management
PHYS 211L	College Physics I Laboratory
CHEM 240	Survey of Organic Chemistry
GEOL 300	Environmental Geology
GEOL 414	Hydrogeology
MICR 202L	Introductory Microbiology Lab
NRM 402	River and Stream Resource Management
NRM 421	Environmental Outreach Methods
ASM 454	Principles and Application of Precision Agriculture
SOIL 217	Introduction to Meteorology & Climatology
SOIL 351	Soil Ecology
SOIL 433	Soil Physics
SOIL 447	Microclimatology
SOIL 480	Soils and Pollution

Total Credits**38****Environmental Communication**

Code	Title	Credits
Required:		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
Select one of the following:		4
COMM/POLS/CJ 325	Applied Research Methods	
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	
Select a minimum of 22 credits from the approved electives list below for Environmental Communication:		22
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	
COMM 301	Rhetorical Traditions	
NRM 420	Scenarios in Natural Resources Management	
COMM 433	Legal Communication	
COMM 442	Digital Media and Society	
COMM 445	Advanced Broadcast Production	
COMM 472	Public Relations Campaigns	
COMM 402	Contemporary Rhetoric	
COMM 261	Introduction to Web Development	
COMM 310	Advanced Media Writing	
COMM 362	Principles of Design For Print	
COMM 383	Organizational Communication I	
NRM 421	Environmental Outreach Methods	
COMM 436	Issues in Mass Communications	
COMM 443	Mass Media and Public Opinion	
COMM 450	Issues in Communication	

COMM 431		Communication Ethics and Law	
Total Credits			38
Pollution Control			
Code	Title		Credits
Required:			
CE 309	Fluid Mechanics		3
CE 370	Introduction to Environmental Engineering		3
CE 408	Water Resources and Supply		3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory		4
MATH 165	Calculus I		4
ME 221	Engineering Mechanics I		3
ME 222	Engineering Mechanics II		3
Select a minimum of 15 credits from the approved electives list below for Pollution Control:			15
Air/Solids:			
CE 472	Solid Waste Management		
SOIL 217	Introduction to Meteorology & Climatology		
SOIL 447	Microclimatology		
Biotic:			
ABEN 499	Special Topics		
BOT 380	Plant Physiology		
BOT/RNG 460	Plant Ecology		
MICR 350	General Microbiology		
MICR 350L	General Microbiology Lab		
ZOO 470	Limnology		
ZOO 476	Wildlife Ecology and Management		
ZOO 477	Wildlife and Fisheries Management Techniques		
Earth/Soils:			
CHEM 240	Survey of Organic Chemistry		
GEOL 300	Environmental Geology		
SOIL 322	Soil Fertility and Fertilizers		
SOIL 351	Soil Ecology		
SOIL 410	Soils and Land Use		
SOIL 433	Soil Physics		
SOIL 444	Soil Genesis and Survey		
SOIL 447	Microclimatology		
SOIL 465	Soil And Plant Analysis		
SOIL 480	Soils and Pollution		
Water:			
ABEN 464	Resource Conservation and Irrigation Engineering		
CE 410	Water and Wastewater Engineering		
CE 421	Open Channel Flow		
CE 477	Applied Hydrology		
CE 478	Water Quality Management		
GEOL 414	Hydrogeology		
RNG/NRM 453	Rangeland Resources Watershed Management		
GEOL/CHEM 428	Geochemistry		
Total Credits			38
Natural Resources Economics			
Code	Title		Credits
Required:			

MATH 146 or MATH 165	Applied Calculus I Calculus I	4
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Select a minimum of 29 credits from the approved electives list below for Natural Resources Economics:		29
AGEC 339	Quantitative Methods & Decision Making	
AGEC 375	Applied Agricultural Law	
ECON 202	Principles of Macroeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 456	History of Economic Thought	
ECON 470	Public Economics	
ECON 480	Industrial Organization	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
POLS 220	International Politics	
POLS 442	Global Policy Issues	
POLS 452	Comparative Political Economy	
SOC 403	Sociology of The Great Plains	
SOC 439	Social Change	
AGEC 347	Principles of Real Estate	
AGEC 484	Agricultural Policy	
COMM 315	Small Group Communication	
ECON 324	Money and Banking	
ECON 410	Econometrics	
ECON 461	Economic Development	
ECON 472	International Trade	
HNES 427	Leisure And Society	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
POLS 360	Principles of Public Administration	
POLS 444	International Law	
POLS 453	Environmental Policy and Politics	
SOC 431	Environmental Sociology	

Total Credits **38**

Social Sciences

Code	Title	Credits
Required:		
SOC 405	Community Development	3
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	4
Select a minimum of 31 credits from the approved electives list below for Social Science:		31
ANTH 204	Archaeology and Prehistory	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity	
CJ 201	Introduction to Criminal Justice	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 481	Disaster Analysis	

GEOG 262	Geography of North America
NRM 401	Urban-Ecosystem Management
NRM 421	Environmental Outreach Methods
POLS 225	Comparative Politics
POLS 422	State and Local Politics
SOC 403	Sociology of The Great Plains
SOC 422	Development Of Social Theory
or ANTH 480	Development of Anthropological Theory
SOC 418	Social Psychology
SOC 431	Environmental Sociology
SOC 443	International Disasters
ANTH 205	Human Origins
ANTH 433	Apes and Human Evolution
ANTH 462	Anthropology and the Environment
ANTH 481	Qualitative Methods in Cultural Anthropology
EMGT 101	Emergencies, Disasters, and Catastrophes
EMGT 262	Disaster Mitigation
EMGT 264	Disaster Recovery
EMGT 463	Voluntary Agency Disaster Services
ENGL 474	Native American Literature
NRM 420	Scenarios in Natural Resources Management
POLS 215	Problems and Policies In American Government
POLS 360	Principles of Public Administration
POLS 453	Environmental Policy and Politics
SOC 439	Social Change
SOC 465	Applied Demographics

Total Credits**38****Degree Notes:**

- **Acceptable Substitutions:** The following courses are accepted as electives in all emphasis areas: NRM courses (may not be double-counted with the NRM Core); a maximum of 3 credits of Field Experience (396/496); a maximum of 3 credits of Co-op Ed (397/497). **All other substitutions require NRM advisor approval and a substitution form to be completed and submitted to the Office of Registration and Records** (<https://www.ndsu.edu/registrar>).

Minor Requirements

Natural Resources Management Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Core Courses		
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
Interdisciplinary Courses		
Select four of the following:		12
ASM/NRM/SOIL 264	Natural Resource Management Systems	
BIOL/ZOO 364	General Ecology	
BOT/RNG 460	Plant Ecology	
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
NRM 421	Environmental Outreach Methods
NRM/RNG 453	Rangeland Resource/Watershed Management
RNG 336	Introduction to Range Management
SOIL 210	Introduction to Soil Science
SOIL 217	Introduction to Meteorology & Climatology
SOC 431	Environmental Sociology
POLS 453	Environmental Policy and Politics
RNG 452	Geographic Information Systems in Range Survey (RNG 452 changing to NRM 452 GIS in NRM)
SOIL 410	Soils and Land Use
SOC 405	Community Development
ZOO 476	Wildlife Ecology and Management

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.

Department of Physics

www.ndsu.edu/physics

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."

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 and Computer Science 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.

Physics (p. 521)

Physics and Computer Science (p. 527)

Physics and Mathematics (p. 529)

Physics

Physics Major

Students who complete a major in Physics are prepared for careers in industrial and governmental research and development and for graduate study in physics, astronomy, engineering, medicine, materials science, and environmental science. In-depth preparation is also provided for teaching in secondary schools.

Students interested in Physics Education are encouraged to declare a double major in their discipline and in education (i.e., Physics Education (p. 422) and Physics). Such double majors may be earned by the successful completion of a few additional credits. Students should contact their adviser, the School of Education (<https://www.ndsu.edu/education>), or the Office of Registration and Records (<https://www.ndsu.edu/registrar>) for details and are encouraged to declare their primary and secondary majors with the Office of Registration and Records, Ceres Hall 110 (<https://www.ndsu.edu/alphaindex/buildings/Building::240>).

Optical Science and Engineering Option

This option includes an interdisciplinary optics/photonics sequence of courses taught by the Departments of Physics (<https://www.ndsu.edu/physics>) and the Department of Electrical and Computer Engineering (<https://www.ndsu.edu/ece>) using a state-of-the-art optics teaching laboratory. This is the only regional program of its type. Optics and lasers are enabling technologies and are applied in most high-tech experiments, communications, devices, medical diagnostics, media, etc. There are more than 5,000 optics-related companies in the United States alone, but even more important, photonics provides the technical foundation for many more. Optical science and engineering has exploded to encompass nearly all fields of science and technology with a consequent shortage of individuals trained in the field. The optical science and engineering option will enhance any job search.

Physics Minor

A Physics minor consists of 19 credits, of which at least eight credits must be completed at NDSU.

Major Requirements

Major: Physics (Standard)

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5

Humanities & Fine Arts (A): Select from current general education list		6
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Social & Behavioral Sciences (B): Select from current general education list		6
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Wellness (W): Select from current general education list		2
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Cultural Diversity (D): Select from current general education list		
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Global Perspectives (G): Select from current general education list		
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Total Credits		41
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 Option

A grade of 'C' or better is required for all PHYS and AST prefix courses.

General Education Requirements	40
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College of Science and Mathematics Requirements	6-12
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Physics Major Requirements (Standard Option)	
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PHYS 171	Introductory Projects in Physics	1
PHYS 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370:Electromagnetic Theory - MSUM)	3-4
PHYS 370	Introduction to Computational Physics	3
PHYS 411 & 411L	Optics for Scientists & Engineers and Optics for Scientists and Engineers Lab	4
Select one of the following:		3-4
PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 489	Physics Projects	3
Physics Electives: Select two of 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	Introduction to Solid State Physics	
MSUM AST	Astronomy courses (300/400-level) with departmental permission	
Related Required Courses		
Mathematics:		
MATH 129	Basic Linear Algebra	2-3
or MATH 429	Linear Algebra	
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives	400-level (MATH 488 & MATH 489 are recommended)	6
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	
Computer Science:		
CSCI 160	Computer Science I	3-4
or ECE 173	Introduction to Computing	
CSCI 161	Computer Science II	4
Degree Requirements: Potential of one credit to reach 122.		1

Total Credits**122-132****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.

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

MATH 165	Calculus I	4
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Science & Technology (S):

PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B): Select from current general education list 6

Wellness (W): Select from current general education list 2

Cultural Diversity (D): Select from current general education list

Global Perspectives (G): Select from current general education list

Total Credits 41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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.

General Education Requirements 40

College of Science and Mathematics Requirements 6-12

Physics Major Requirements (Optical Science and Engineering Option)

PHYS 171	Introductory Projects in Physics	1
PHYS 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370: Electromagnetic Theory - MSUM)	3-4
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

Select one of the following:		3-4
PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 489	Physics Projects	3
CSCI 160	Computer Science I	3-4
or ECE 173	Introduction to Computing	
EE 206	Circuit Analysis I	4

Related Required Courses

Mathematics:

MATH 129	Basic Linear Algebra	2-3
or MATH 429	Linear Algebra	
MATH 166	Calculus II	4
MATH 265	Calculus III	4
MATH 266	Introduction to Differential Equations	3
MATH Electives	(400-level (MATH 452, MATH 481, and/or MATH 488 are recommended)	6

Chemistry: Select one of the following (150/160 recommended):

CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	

Select one of the following (151/161 recommended):

CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Degree Requirements: Potential of one credit to reach 122

1

Total Credits**122-132****Recommended Electives for Optical and Engineering Option**

ECE 311	Circuit Analysis II	4
ECE 321	Electronics II	2
ECE 417	Optical Signal Transmission	3
ECE 483	Instrumentation for Engineers	3

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements**Physics Minor****Minor Requirements****Required Credits: 19****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.

Freshman			
Fall	Credits	Spring	Credits
PHYS 171	1	PHYS 251	4
UNIV 189	1	PHYS 251L	1
MATH 165	4	PHYS 251R	1
CHEM 150	3	MATH 129	2
CHEM 160	1	MATH 166	4
ENGL 110 ^C credit automatically granted if you earn a "C" in ENGL 120	3	CHEM 151	3
ENGL 120 ^{can} enroll in ENGL 120 if ACT score > 17	3	CHEM 161	1
Wellness Elective	2		
	18		16

Sophomore			
Fall	Credits	Spring	Credits
PHYS 252	4	CSCI 161	4
PHYS 252L	1	PHYS 350	3
PHYS 252R	1	MATH 266	3
MATH 265	4	COMM 110	3
CSCI 160	4	Humanities/Fine Arts Elective	3
Humanities/Fine Arts Elective	3	Social/Behavioral Science Elective	3
	17		19

Junior			
Fall	Credits	Spring	Credits
PHYS 360	3	PHYS 370	3
PHYS 455	3	PHYS 486	3
PHYS 485	3	ENGL 324	3
MATH 4XX Math Elective	3	MATH 4XX Math Elective	3
Social/Behavioral Science Elective	3	Humanities/Fine Arts Elective	3
	15		15

Senior			
Fall	Credits	Spring	Credits
PHYS 361	3	PHYS 489	3
PHYS 462	3	PHYS 463	3
PHYS 411	3	Physics Elective	3
PHYS 411L	1	Free Elective	3

Social/Behavioral Science Elective	3	
	13	12

Total Credits: 125

Physics and Computer Science

Computer Science and Physics Double Major

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.

Major Requirements

Major: Computer Science & Physics

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

Required Degree Credits to Graduate: 134

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 CSCI, PHYS, and AST prefix courses.

Code	Title	Credits
General Education Requirements		40
College of Science and Mathematics Requirements		6-12
Computer Science Major Requirements		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
CSCI 213	Modern Software Development	3
CSCI 336	Theoretical Computer Science II	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 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370: Electromagnetic Theory - MSUM)	3-4
PHYS 370	Introduction to Computational Physics	3
Select one of the following:		3-4
PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	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	Introduction to Solid State Physics	
PHYS 489	Physics Projects (If not used to satisfy project requirement)	
MSUM AST	Astronomy courses (300/400-level) with departmental permission	
Related Required Courses		
MATH 129 or MATH 429	Basic Linear Algebra Linear Algebra	2-3
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 or PHYS 489	Software Projects Capstone Physics Projects	3
Total Credits		134-143

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Physics and Mathematics

Mathematics and 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.

Major Requirements

Major: Mathematics & Physics

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

Required Degree Credits to Graduate: 132

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	5
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	5
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
College of Science and Mathematics Requirements		6-12
Mathematics Major Requirements		

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 420	Abstract Algebra I	3
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3
MATH 421	Abstract Algebra II	3
or MATH 451	Real Analysis II	
MATH 491	Seminar	2
Mathematics Electives	Any MATH prefix course 400-level or higher (MATH 488 & MATH 489 are recommended)	6
Physics Major Requirements		
PHYS 171	Introductory Projects in Physics	1
PHYS 251R	University Physics I Recitation	1
PHYS 252R	University Physics II Recitation	1
PHYS 350	Modern Physics	3
PHYS 360	Modern Physics II	3
PHYS 361	Electromagnetic Theory (or PHYS 370: Electromagnetic Theory (MSUM))	3-4
PHYS 370	Introduction to Computational Physics	3
Select one of the following:		3-4
PHYS 455	Classical Mechanics	
PHYS 330	Intermediate Mechanics (MSUM)	
PHYS 462	Heat & Thermodynamics	3
PHYS 485	Quantum Mechanics I	3
PHYS 486	Quantum Mechanics II	3
PHYS 489	Physics Projects	3
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 463	Statistical Mechanics	
PHYS 481	Introduction to Solid State 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):		
CHEM 150 & CHEM 160	Principles of Chemistry I and Principles of Chemistry Laboratory I	4
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	
Select one of the following (151/161 recommended):		
CHEM 151 & CHEM 161	Principles of Chemistry II and Principles of Chemistry Laboratory II	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	

Total Credits**132-140****Program Notes**

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Department of Psychology

www.ndsu.edu/psychology/

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 Centers

Information for students is available on the department web site and in the department main office in Minard Hall 232 (<https://www.ndsu.edu/alphaindex/buildings/Building::381>). Topics include requirements for majors and minors, COOLS, graduate school, and career information.

Psychology (p. 531)

Neuroscience (p. 534)

Managerial Psychology (p. 535)

Psychology

Psychology Major

A total of 122 credits is required for a major in Psychology leading toward a Bachelor of Science or Bachelor of Arts degree.

Psychology Minor

A minor in Psychology offers students electing majors in other disciplines the opportunity to complement their studies with a coherent set of psychology courses. Different courses are compatible with interests and career goals of students in major areas such as business, child development and family science, and computer science. Students planning a Psychology minor should consult with a faculty adviser from the Department of Psychology (<https://www.ndsu.edu/psychology/>).

Students selecting a minor in Psychology must complete 18 credits in psychology (excluding PSYC 494 Individual Study or PSYC 496 Field Experience). These 18 semester credits may not be taken pass/fail and must include at least one 3-credit 300- or 400-level course. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Psychology

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

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. Select from current general education list		10
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Humanities & Fine Arts (A): Select from current general education list	6
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Social & Behavioral Sciences (B): Select from current general education list (cannot use the gen ed PSYC prefix courses to satisfy this category)	6
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Wellness (W): Select from current general education list	2
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Cultural Diversity (D): Select from current general education list	
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Global Perspectives (G): Select from current general education list	
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Total Credits	40
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College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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

General Education Requirements	40
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College of Science and Mathematics Requirements	6-12
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Psychology Major Requirements	
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PSYC 111	Introduction to Psychology	3
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC	Electives	6

Psychology 400 Level Electives:	15
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Select one course from 3 of the following 4 groups (A-D), plus one capstone course and one other PSYC course numbered 400 or higher to equal 15 credits.

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 one of the following:	
PSYC 480	History & Systems
PSYC 489	Honors Thesis
PSYC 400 Level	Additional 400 level PSYC course - may be from PSYC 489, PSYC 494, or PSYC 496 courses taken for a grade.

Related Required Course

MATH 103	College Algebra (or higher level)	3
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Bachelor of Science Supporting Track 14

Student seeking a B.S. degree must select one of the following tracks in consultation with an adviser - 14 credit minimum. Courses selected for either of the supporting track cannot count toward the track and general education.

Natural Science Track: 14 additional credits in math/science. Prefixes accepted include: BIOL, BIOG, BOT, CHEM, ENT, GEOL, MATH, MICR, PHYS, PLSC, STAT, OR ZOO.

Social Science Track: 14 additional credits in social sciences (not Psychology). Prefixes accepted include: ANTH, HDFS general education courses or prerequisite is a general education course; CJ, ECON, POLS, or SOC. 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
MGMT 450	Human Resource Management
GEOG 151	Human Geography
GEOG 161	World Regional Geography
GEOG 262	Geography of North America

Minor Track: A minor in an approved area

Degree Requirements: Potential of 29 credits to reach 122	29
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Total Credits

122-128

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Minor Requirements**Psychology Minor****Minor Requirements**

Required Credits: 18

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.

Neuroscience

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 Undergraduate Major, Minor, Certificate, or Adviser Change Form (<https://www.ndsu.edu/registrar/forms/majorchange>) which is found online.

Minor Requirements

Neuroscience Minor

Minor Requirements

Required Credits: 17

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	Thinking & Making Decisions	
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 494	Individual Study (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.

Managerial Psychology

Minor Requirements

Managerial Psychology

Minor Requirements

Required Credits: 18

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	Thinking & Making Decisions	3
PSYC 453	Organizational Psychology	3
Total Credits		18

Minor Requirements and Notes

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

Department of Statistics

www.ndsu.edu/statistics

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.

Statistics (p. 535)

Statistics and Mathematics (p. 538) (includes Pre-Actuarial option)

Behavioral Statistics (p. 541)

Statistics

Statistics Major

The Department of Statistics offers a major leading to a B.S., B.A., M.S., or Ph.D. degree, as well as minors in Statistics for both undergraduate and graduate students. The program is flexible enough to be individually planned around prior experience and in accord with professional goals. The program emphasis is on applied statistics, consulting, and computational methods.

Statistics Minors

Two different tracks within the Statistics minor are offered. A Department of Statistics (Morrill 221 (<https://www.ndsu.edu/alphaindex/buildings/Building::382>)) adviser for minors must approve the program.

Major Requirements

Major: Statistics

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3

One Course in Upper Level Writing: Select from current general education list	3
COMM 110 Fundamentals of Public Speaking	3
Quantitative Reasoning (R):	
MATH 165 Calculus I	4
Science & Technology (S):	
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. Select from current general education list	10
Humanities & Fine Arts (A): Select from current general education list	6
Social & Behavioral Sciences (B): Select from current general education list	6
Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G): Select from current general education list	
Total Credits	41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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 courses used toward the major.

General Education Requirements	40
College of Science and Mathematics Requirements	6-12
Statistics Major Requirements	
MATH 129 Basic Linear Algebra	2
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	3
STAT 476 Actuary Exam Study II	1
or STAT 491 Seminar	
Electives: Select 15 credits from the following (Can choose only one CSCI course):	15
CSCI 161 Computer Science II	
CSCI 418 Simulation Models	
MATH 429 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	
STAT 473 Actuarial Statistical Risk Analysis	
STAT 477 Introductory Survival and Risk Analysis I	

STAT 478	Introductory Survival & Risk Analysis II	
Related Required Courses		
CSCI 160	Computer Science I	
Select one of the following:		3
CSCI 222	Discrete Mathematics	
MATH 270	Introduction to Abstract Mathematics	
Minor Requirement: A minor is required in one of the following disciplines: Social Science, Physical Science, Biological Science, Business, Mathematics, or Computer Science.		16
Electives: Elective credits to reach 122		8-14
Total Credits		122

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Two tracks are available:

- **Statistical (Standard) Track** (p. 537)
- **Applied Statistics Track** (p. 537)

Minor Requirements

Statistics (Standard) Track

Required Credits: 22

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

Minor Requirements

Applied Statistics Track

Required Credits: 17

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.

Statistics and Mathematics

Mathematics and Statistics Double Major

Standard Option

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.

Major Requirements

Major: Mathematics & Statistics

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One course in Upper Level Writing: Select one course from the current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from current general education list		6
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G): Select from current general education list		
Total Credits		41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
Science and Mathematics College Requirement		6-12
Math Major Core Requirements		
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 420	Abstract Algebra I	3
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3
MATH 451	Real Analysis II	3
MATH 491	Seminar	2
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study II	1
or STAT 491	Seminar	
Statistics Electives	400 level other than those listed above	18
Related Required Courses:		
Computer Science		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Degree Requirements: Potential of 5 elective credits to reach 122		5
Total Credits		122-123

Major Requirements

Major: Mathematics & Statistics Pre-Actuarial Option

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

Required Degree Credits to Graduate: 122

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
MATH 165	Calculus I	4
Science & Technology (S):		
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. Select from current general education list		10
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3

Wellness (W): Select from current general education list	2
Cultural Diversity (D): Select from current general education list	
Global Perspectives (G):	
ECON 201 Principles of Microeconomics	3
Total Credits	41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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
General Education Requirements		40
Science and Mathematics College Requirements		6-12
Math Major Requirements		
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 376	Actuarial Exam Study	1
MATH 429	Linear Algebra	3
MATH 450	Real Analysis I	3
MATH 488	Numerical Analysis I	3
MATH 451 or MATH 489	Real Analysis II Numerical Analysis II	3
Statistics Major Requirements		
STAT 330	Introductory Statistics	3
STAT 461	Applied Regression Models	3
STAT 462	Introduction to Experimental Design	3
STAT 467	Probability and Mathematical Statistics I	3
STAT 468	Probability and Mathematical Statistics II	3
STAT 476	Actuary Exam Study II	1
Statistics Electives	Courses must be at the 400 level and not listed above	9
Related Required Courses		
Computer Science:		
CSCI 160	Computer Science I	4
CSCI 161	Computer Science II	4
Accounting, Business, & Economics Courses:		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	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	Money and Capital Markets
FIN 460	Corporate Finance

Total Credits**122-128**

* Will satisfy the General Education Science & Technology category requirement.

Program Notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

Behavioral Statistics

Behavioral Statistics Major

This degree is a joint effort between the Department of Statistics and the Department of Psychology (p. 531). It is recommended that a student wishing to obtain a degree in Behavioral Statistics consult with an adviser 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.*

Major Requirements

Major: Behavioral Statistics

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

Required Degree Credits to Graduate: 122

General Education Requirements

First Year Experience (F):

UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
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Communication (C):

ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select from current general education list		3
COMM 110	Fundamentals of Public Speaking	3

Quantitative Reasoning (R):

STAT 330	Introductory Statistics	3
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Science & Technology (S):

BIOL 126	Human Biology	3
CHEM 117 & 117L	Chemical Concepts and Applications and Chem Concepts and Applications Lab	4
CSCI 114 or CSCI 116	Microcomputer Packages Business Use of Computers	3-4

Humanities & Fine Arts (A): Select from current general education list 6

Social & Behavioral Sciences (B):

ANTH 111	Introduction to Anthropology	3
SOC 110	Introduction to Sociology	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
ANTH 111	Introduction to Anthropology	3
Global Perspectives (G): Select from current general education list		
Total Credits		40-41

College Requirements

Bachelor of Science (BS) Degree – An additional 6 credits in Humanities or Social Sciences*

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.

* 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

General Education Requirements		40
College of Science and Mathematics Requirements		6-12
Behavioral Statistics Requirements		
PSYC 111	Introduction to Psychology	3
PSYC Elective	200-400 Level Electives	6
PSYC 350	Research Methods I	3
PSYC 351	Research Methods II	3
PSYC Elective	400 Level Elective	3
STAT 331	Regression Analysis	2
STAT 462	Introduction to Experimental Design	3
STAT 470	Statistical SAS Programming	3
or STAT 471	Introduction to the R Language	
Select one of the following:		1-3
PSYC 480	History & Systems	
PSYC 489	Honors Thesis	
STAT 491	Seminar	
Related Courses Required		
Mathematics:		
MATH 103	College Algebra (if needed as a prerequisite) ^{Or Higher Level}	3
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	
Group E - Select two of the following:		6
STAT 460	Applied Survey Sampling	
STAT 463	Nonparametric Statistics	
STAT 469	Introduction to Biostatistics	
STAT 472	Time Series	
Degree Requirements: Potential of 28 elective credits to reach 122		28
Total Credits		122-130

Program notes

- Except for courses offered only as pass/fail grading, no course may be taken Pass/Fail.

College of University Studies

Morrill Hall 112, 701-231-7014, www.ndsu.edu/univ_studies

Programs in the College of University Studies are designed for students with general needs or unique goals. These programs involve general studies for undeclared students and the Bachelor of University Studies degree (a tailored degree program) for students with distinctive educational goals.

General Studies

The general studies program is designed to serve new students who wish to enter college but are unsure about their plans for the future. Special attention is given to selecting the best advisers, giving students a chance to explore a variety of fields, and acquainting them with people who are familiar with post-graduation opportunities.

Undeclared students in general studies may elect any pattern of courses for which they have satisfactory preparation. They are encouraged to carry a full load of fifteen credits; however, they may carry as little as one course (usually three hours of class a week), a full load of four or five courses, or on rare occasions, as many as six or seven courses.

Transfer to other colleges on campus from this program or into this program is possible at any time. Most students elect to pursue a major in one of the other academic colleges at North Dakota State University no later than their third semester.

Bachelor of University Studies Degree

Students with no fewer than 15 semester credits remaining and wishing to tailor their own degree may do so by proposing a plan of study. Upon approval, this plan of study leads to a Bachelor of University Studies (B.U.S.) degree.

Students seeking the Bachelor of University Studies (https://www.ndsu.edu/univ_studies/bachelor_of_university_studies_degree) degree usually begin by visiting the Associate Dean's office and talking with an adviser about their long-range hopes and aspirations. Together, they select an adviser whose professional skills and interests most closely coincide with those of the student. The adviser will work with the student in preparing 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 Academic Policies/Program Review committee of the College of University Studies 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 or an academic minor, but students are encouraged to create an area(s) of emphasis.

Experiential Learning Credit

Students may gain credit for university-level experiential learning depending on how their experience relates to their educational objectives and the pattern of formal education they plan to pursue. Students requesting credit for university-level experience must prepare summaries of their learning, including time periods, job descriptions, responsibilities, on-the-job training, verification of employment, and any other pertinent information according to published guidelines. Credit may be requested for any type of experience provided the experience leads to university-level learning and is related to educational goals. Ultimately, students must be prepared to demonstrate increased knowledge, problem-solving ability, ability to understand people, or some other significant personal growth as the result of their experience.

Cooperative Education and Internships

Cooperative Education and Internship Program (<https://www.ndsu.edu/career/internshipprogram>), an offering of the Career Center, provides students an opportunity to integrate classroom study and career goals with paid, career related work experience for academic credit. Work must be engaged

learning experience and may be full or part time. A Cooperative Education or Internship experience may substantially improve students' employment opportunities after graduation. See the Career Center (<https://www.ndsu.edu/career>) web site for further information.

Degree Plan Proposal

The degree plan must be submitted to the Academic Policies/Program Review committee through the Office of the Associate Dean of the College of University Studies by guideline due dates (October 1 for spring or summer graduation; February 1 for fall graduation). No fewer than 15 credits must be proposed (remain to be taken after approval) and included in the proposal. Students who submit proposals after the due date will not be considered for graduation the following semester. Students are encouraged to submit their proposals during the junior year with approximately 30 credits proposed.

A program must include the following: at least 15 credits of study to be completed after approval; a total of no fewer than 122 credits (including credit for military experience, previous college work, work experience, etc.); 37 credits of junior- and senior-level courses (300-400 level); a cumulative grade-point average of 2.00 based on all work completed at NDSU; 60 credits from a four-year institution; and the residency requirement (36 credits must be completed at NDSU). Ordinarily, the last 30 credits must be resident credits. In addition, each program must fulfill the General Education requirements (<https://www.ndsu.edu/registrar/gened>) including the Capstone Experience, Cultural Diversity and Global Perspectives categories, and have as a minimum the following:

Requirements	Credits
First-Year Experience	1
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	43

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 University Studies that students seeking a B.U.S. degree will, following approval of the B.U.S. proposal (https://www.ndsu.edu/univ_studies/bachelor_of_university_studies/bus_guide_and_forms), 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 College 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. B.U.S. proposals are subject to the NDSU baccalaureate degree requirements.

For further information, contact:

- Carolyn A. Schnell, Associate Dean
- College of University Studies
- 112 Morrill Hall
- NDSU Dept. 2800, P.O. Box 6050
- North Dakota State University
- Fargo, ND 58108-6050
- Telephone: 701-231-7014
- www.ndsu.edu/univ_studies

Undergraduate Programs

A

- Accounting (p. 263)
- Aerospace Studies (p. 295) (*minor only*)
- Agribusiness (p. 80)
- Agricultural and Biosystems Engineering (p. 296)

- Agricultural Communication (p. 158)
- Agricultural Economics (p. 83)
- Agricultural Education (p. 390)
- Agricultural Systems Management (p. 92)
- Animal Health Management (p. 96) (*certificate only*)
- Animal Science (p. 97)
- Anthropology (p. 235)
- Apparel, Retail Merchandising and Design (p. 373)
- Architecture (p. 151)
- Art (p. 250)
- Art Education (p. 254)

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B

- Behavioral Statistics (p. 541)
- Biochemistry and Molecular Biology (p. 478)
- Biological Sciences (p. 463)
- Biological Sciences Education (p. 393)
- Biotechnology (p. 549)
- Botany (p. 469)
- Business Administration (p. 277)

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C

- Chemistry (p. 480)
- Chemistry Education (p. 395)
- Civil Engineering (p. 306)
- Coatings and Polymeric Materials (p. 483) (*minor only*)
- Community Development (p. 237) (*minor only*)
- Comprehensive Science Education (p. 397)
- Computer Engineering (p. 316)
- Computer Science (p. 485)
- Computer Science and Mathematics (p. 489)
- Computer Science and Physics (p. 492)
- Construction Engineering (p. 310)
- Construction Management (p. 312)
- Criminal Justice (p. 174)
- Crop and Weed Science (p. 126)

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D

- Dietetics (p. 431)

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E

- Earth Science Education (p. 398)
- Economics (p. 86)
- Electrical Engineering (p. 318)
- Elementary Education & Human Development and Family Science (p. 449) (*dual degree program*)
- Emergency Management (p. 187)
- English (p. 191)

- English Education (p. 400)
- Environmental Geology (p. 501) (*minor only*)
- Equine Science (p. 103)
- Exercise Science (p. 435)
- Extension Education (p. 403) (*minor only*)

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F

- Family and Consumer Sciences Education (p. 403)
- Finance (p. 267)
- Food Safety (p. 552)
- Food Science (p. 129)
- Fraud Investigation (p. 270) (*minor only*)
- French (p. 211)
- French Education (p. 405)
- French Studies (p. 213) (*minor only*)

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G

- General Agriculture (p. 77)
- Geography (p. 501) (*minor only*)
- Geology (p. 498)
- German Studies (p. 214) (*minor only*)
- Gerontology (p. 556) (*minor only*)
- Global Business (p. 281) (*2nd major only*)

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H

- Health Communication (p. 161)
- Health Education (p. 409)
- History (p. 200)
- History Education (p. 412)
- Horticulture (p. 131)
- Hospitality and Tourism Management (p. 380)
- Human Development and Family Science (p. 448)

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I

- Industrial Engineering and Management (p. 325)
- Interior Design (p. 383)
- International Studies (p. 556) (*second major only*)

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J

- Journalism (p. 163)

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L

- Landscape Architecture (p. 154)
- Large Animal Veterinary Technology (p. 106) (*minor only*)

- Logistics Management (p. 560) (*minor only*)

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M

- Management (p. 283)
- Management Communication (p. 166)
- Management Information Systems (p. 271)
- Managerial Psychology (p. 535) (*minor only*)
- Manufacturing Engineering (p. 329)
- Marketing (p. 286)
- Mathematics (p. 502)
- Mathematics and Computer Science (p. 505)
- Mathematics Education (p. 414)
- Mathematics and Physics (p. 507)
- Mathematics and Statistics (p. 510)
- Mechanical Engineering (p. 333)
- Medical Laboratory Science (p. 350)
- Microbiology (p. 141)
- Military Science (p. 337) (*minor only*)
- Music (p. 218)
- Music Education (p. 224)
- Music Education (Instrumental) (p. 415)
- Music Education (Vocal) (p. 417)

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N

- Natural Resources Management (p. 561)
- Neuroscience (p. 534) (*minor only*)
- New Media and Web Design (p. 168)
- Nursing (p. 357)

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P

- Pharmacy (p. 361)
- Philosophy/Humanities (p. 203)
- Physical Education (p. 419)
- Physics (p. 521)
- Physics and Computer Sciences (p. 527)
- Physics Education (p. 422)
- Physics and Mathematics (p. 529)
- Political Science (p. 179)
- Professional Selling (p. 290) (*certificate only*)
- Psychology (p. 531)
- Public History (p. 205)

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R

- Radiologic Sciences (p. 352)
- Range Science (p. 121)
- Religious Studies (p. 208) (*minor only*)

- Respiratory Care (<http://bulletin.ndsu.edu/undergraduate/colleges/pharmacy-nursing-allied-sciences/allied-sciences/respiratory-care>)

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S

- Social Science (p. 209)
- Social Science Education (p. 424)
- Social Work & Human Development and Family Science (p. 452) (*dual degree program*)
- Sociology (p. 238)
- Soil Science (p. 123)
- Spanish (p. 215)
- Spanish Education (p. 425)
- Spanish Studies (p. 217) (*minor only*)
- Sport Management (p. 446)
- Sport and Urban Turfgrass Management (p. 136)
- Statistics (p. 535)
- Statistics and Mathematics (p. 538)
- Strategic Communication (p. 171)

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T

- Theatre Arts (p. 242)
- Therapeutic Horsemanship (p. 107) (*minor only*)
- Therapeutic Riding (p. 107) (*certificate only*)

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U

- University Studies (p. 543)

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V

- Vaccinology (p. 144) (*minor only*)
- Veterinary Technology (p. 108)

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W

- Web Design (p. 171) (*minor only*)
- Wellness (p. 455) (*minor only*)
- Women and Gender Studies (p. 568)

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Z

- Zoology (p. 471)

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Interdisciplinary Studies

Interdisciplinary study involves an integration of more than one discipline and perspective on a topic. North Dakota State University offers several interdisciplinary programs at the undergraduate level. The undergraduate programs listed in this section are offered through collaborative partnerships of departments in more than one academic college.

Biotechnology (p. 549)

Fraud Investigation (p. 555)

Gerontology (p. 556)

Great Plains Institute of Food Safety (p. 552)

International Studies (p. 556)

Logistics Management (p. 560)

Natural Resources Management (p. 561)

Women and Gender Studies (p. 568)

Biotechnology

Biotechnology

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. The methodologies 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 protoplasts, and the regeneration of whole plants from single cells.

Biotechnology also is concerned with the large-scale fermentation processes that utilize some of these novel organisms for the production of pharmaceuticals, diagnostic tests for diseases, feed additives, enzymes, and hormones.

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. 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 are all examples of successful biotechnology.

The Biotechnology program is offered in either the College of Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>) or the College of Science and Mathematics (<https://www.ndsu.edu/scimath>) and leads to the Bachelor of Science degree or Bachelor of Arts degree (College of Science and Mathematics only). The curriculum is designed to provide students with knowledge and experience in both basic and applied sciences. Students have an opportunity to work with scientists in various areas including, animal science, biochemistry, biology, botany, chemistry, horticulture, microbiology, pharmaceutical sciences, plant pathology, plant science, and zoology. Faculty in each of the cooperating life-science departments has been identified to serve as advisers and research mentors for students who select the biotechnology major. Graduates of this program have excellent opportunities for employment in the biotechnology industry or for graduate education.

Students majoring in biotechnology are required to perform a research project in the laboratory of a faculty member/scientist, and to prepare a senior thesis describing their research project. A 2.50 institutional grade-point average is required to graduate from the program.

Biotechnology Minor

A minor in biotechnology requires satisfactory completion of 21 credits in the following courses. A minimum of eight credits must be taken at NDSU.

Major Requirements

Major: Biotechnology

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F)		
AGRI/UNIV 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C)		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Upper Division Writing: Select one from the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	

ENGL 459	Researching and Writing Grants and Proposal	
MICR 354	Scientific Writing	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S)		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
Select one sequence from the following:		4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	
PHYS 251 & 251L	University Physics I and University Physics I Laboratory	
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B): Select from the current general education list		6
Wellness (W): Select from the current general education list		2
Cultural Diversity (D): Select from the current general education list		
Global Perspectives (G): Select from the current general education list		
Total Credits		42

Major requirements

Code	Title	Credits
General Education Requirements		40
Biotechnology Requirements		
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
BIOC 461	Foundations of Biochemistry and Molecular Biology II	3
BIOC 465	Principles of Physical Chemistry and Biophysics	4
BIOC 474	Methods of Recombinant DNA Technology	3
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 470	Basic Immunology	3
MICR 471	Immunology and Serology Laboratory	2
MICR 482	Bacterial Genetics & Phage	3
MICR 491	Seminar (Biotechnology)	1-5
MICR 494	Individual Study (Senior Research)	2-4
MICR 494	Individual Study (Senior Thesis)	1
Supporting Requirements		
AGRI 150	Agriculture Orientation (Applies to students earning the degree from the CoAFSNR only; Students transferring in 24 or more credits do not need to take AGRI 150)	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 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
CHEM 342	Organic Chemistry II	3
CSCI 114 or CSCI 122	Microcomputer Packages Visual BASIC	3
Select one from the following:		8
MATH 146 & MATH 147	Applied Calculus I and Applied Calculus II	

MATH 165 & MATH 166	Calculus I and Calculus II	
Select one from the following:		4
PHYS 212 & 212L	College Physics II and College Physics II Laboratory	
PHYS 252 & 252L	University Physics II and University Physics II Laboratory	
PLSC 315 & 315L	Genetics and Genetics Laboratory	4
Major Elective in Physiology: Select 3 credits from the following:		3
BOT 380	Plant Physiology	
ZOO 460	Animal Physiology	
MICR 480	Bacterial Physiology	
Major Elective in Biotechnology Technique: Select 4-6 credits from the following:		4-6
BIOC 473	Methods of Biochemical Research	
BIOC 487	Molecular Biology of Gene Expression	
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.		
Degree Requirements: Potential of 7 credits to reach 128		7
Total Credits		128-136

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

Biotechnology Minor

Required Credits: 21

Code	Title	Credits
BIOC 460 & 460L	Foundations of Biochemistry and Molecular Biology I and Foundations of Biochemistry I Laboratory	4
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
BOT 380	Plant Physiology	
MICR 470	Basic Immunology	
MICR 471	Immunology and Serology Laboratory	
MICR 482	Bacterial Genetics & Phage	

PPTH 324	Introductory Plant Pathology
ZOO 370	Cell Biology
ZOO 460	Animal Physiology

Total Credits**21****Minor Requirements and Notes**

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

Great Plains Institute of Food Safety

www.ag.ndsu.edu/foodsafety

Great Plains Institute of Food Safety

An interdisciplinary team of faculty with expertise in food safety from various departments within NDSU's Colleges of: Agriculture, Food Systems, and Natural Resources (<http://www.ag.ndsu.edu/academics>); Arts, Humanities and Social Sciences (<https://www.ndsu.edu/ahss>); Human Development and Education (<https://www.ndsu.edu/hde>); Engineering (<https://www.ndsu.edu/coe>); and Science and Mathematics (<https://www.ndsu.edu/scimath>) has formed the Great Plains Institute of Food Safety and developed a unique educational experience for NDSU students. The comprehensive food safety curriculum leads to B.S., M.S., and Ph.D. degrees in Food Safety, an Undergraduate Minor in Food Safety. A graduate Certificate in Food Protection is also offered (see Graduate School (<https://www.ndsu.edu/gradschool>) web site for complete curriculum requirements). All these programs are unified around the single issue of food safety, an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide, and an area in which shortages of expertise are manifest. Students in food safety are heavily recruited for employment in the food safety fields.

The curriculum is based on contemporary educational theory and employs experiential learning techniques to foster development of students' critical-thinking abilities, collaborative and problem-solving skills, and awareness of employment opportunities. Courses are fully integrated so that students have the opportunity to troubleshoot food-safety issues from "farm-to-fork." The program strives to meet students' present and future educational needs.

Food Safety Major

A number of undergraduate and graduate programs of study in food safety are offered through the Great Plains Institute for Food Safety. Food safety is an area of concern for many Americans, the current target of tremendous interest, effort, and spending worldwide and an area in which shortages of expertise are manifest. For further information, refer to the Interdisciplinary Programs (p. 548) section of this Bulletin.

Food Safety Minor

Students may minor in Food Safety by completing a total of 16 credits. A minimum of eight credits must be taken at NDSU.

Major Requirements**Major: Food Safety**

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		
ENGL 320	Business and Professional Writing	3
ENGL 321	Writing in the Technical Professions	3
ENGL 324	Writing in the Sciences	3
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		

CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
PHYS 211 & 211L	College Physics I and College Physics I Laboratory	4
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Science (B):		
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
ECON 201	Principles of Microeconomics	3
Total Credits		42

Major Requirements

Students must declare a minor as part of the requirements for this major.

Code	Title	Credits
General Education Requirements		40
Required Core Courses for Food Safety		
AGRI 150	Agriculture Orientation (Students transferring in 24 or more credits do not need to take AGRI 150.)	1
ANSC 340	Principles of Meat Science	3
CFS 200 or CFS 210	Introduction to Food Systems Introduction to Food Science and Technology	2-3
Select one from the following:		3-4
CFS 460 & CFS 461	Food Chemistry and Food Chemistry Laboratory	
CFS 464	Food Analysis	
Select one from the following:		3-4
CFS 370	Food Processing I	
CFS 470 & CFS 471	Food Processing II and Food Processing Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	5
MICR 474	Epidemiology	3
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
SAFE 452	Food Laws and Regulations	3
SAFE 484	Food Safety Practicum	1-3
SAFE/COMM 485	Risk and Crisis Communication	3
Supporting Courses		
BIOC 260 or BIOC 460	Elements of Biochemistry Foundations of Biochemistry and Molecular Biology I	3-4
BIOL 150 & 150L	General Biology I and General Biology I Laboratory	4

CHEM 341 & 341L	Organic Chemistry I and Organic Chemistry I Laboratory	4
Select one of the following:		3-4
MATH 105	Trigonometry	
MATH 146	Applied Calculus I	
MATH 165	Calculus I	
Degree Requirements: Potential of a minimum of 36 credits to reach 128.		36
Total Credits		128-135

Minor Requirements

Food Safety Minor

Minor Requirements

Required Credits: 16

Code	Title	Credits
Required Courses		
SAFE 401	Food Safety Information & Flow of Food	1
SAFE 402	Foodborne Hazards	1
SAFE 403	Food Safety Risk Assessment	1
SAFE 404	Epidemiology of Foodborne Illness	1
SAFE 405	Costs of Food Safety	1
SAFE 406	Food Safety Crisis Communication	1
SAFE 407	Food Safety Risk Management	1
SAFE 408	Food Safety Regulatory Issues	1
SAFE 409	Food Safety Risk Communication & Education	1
Elective Courses: Select 7 credits from the following:		7
AGEC 339	Quantitative Methods & Decision Making	
AGEC 344	Agricultural Price Analysis	
AGEC 375	Applied Agricultural Law	
AGEC 484	Agricultural Policy	
ANSC 340	Principles of Meat Science	
ANSC 344	Fundamentals of Meat Processing	
ANSC 370	Fundamentals/Animal Disease	
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	
CFS 471	Food Processing Laboratory	
CFS 480	Food Product Development	
COMM 486		
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 461	Business Continuity and Crisis Management	
HNES 141	Food Sanitation	
HNES 361 & 361L	Foodservice Systems Management I and Foodservice Systems Management I Laboratory	
HNES 460 & 460L	Foodservice Systems Management II and Foodservice Systems Management II Laboratory	
MICR 350 & 350L	General Microbiology and General Microbiology Lab	
MICR 453	Food Microbiology	
MICR 460 & 460L	Pathogenic Microbiology and Pathogenic Microbiology Laboratory	

MICR 470	Basic Immunology
MICR 471	Immunology and Serology Laboratory
MICR 474	Epidemiology
PLSC 110	World Food Crops
PPTH 460	Fungal Biology
SAFE 452	Food Laws and Regulations
SAFE 484	Food Safety Practicum
SAFE/COMM 485	Risk and Crisis Communication

Total Credits**16****Minor Requirements and Notes:**

- A minimum of 8 credits must be taken at NDSU

Fraud Investigation

Fraud Investigation

The Department of Accounting, Finance, and Information Systems, in collaboration with the Department of Criminal Justice and Political Science, 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, Finance, and Information Systems (https://www.ndsu.edu/acct_fin_mis) or the Department of Criminal Justice and Political Science (<https://www.ndsu.edu/cjps>) for further information on requirements.

Minor Requirements

Fraud Investigation Minor

Minor Requirements

Required Credits: 20-21

This minor requires a grade of 'C' or better and a GPA of 2.50 in all courses that make up this minor. The only exception is ACCT 200 and ACCT 201, which require grades of 'B' or better to enroll in 300-400 level accounting courses.

Code	Title	Credits
Requirements		
ACCT 200	Elements of Accounting I	3
ACCT 201	Elements of Accounting II	3
ACCT 410	Fraud Examination *	3
ACCT 411	Advanced Fraud Examination **	3
Criminal Justice Courses		
CJ 201	Introduction to Criminal Justice	3
CJ 230	Criminology and Criminal Law	3
Criminal Justice or Political Science Course		
CJ 330 or POLS 431	Criminal Law and Procedure Constitutional Law-Criminal Justice	2-3
Total Credits		20-21

* ACCT 421 Auditing I: may substitute for this course if the student has taken ACCT 610 Fraud Examination and ACCT 611 Advanced Fraud Examination

** 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 (<https://www.ndsu.edu/business/majorsminorslist/minors>) with the College of Business. Acceptance into this minor program requires students to have a minimum institutional cumulative GPA of 2.50 and at least junior standing (60 credits). To complete a minor, students must earn at least a 2.50 GPA in courses used to satisfy 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 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.

Gerontology

Gerontology

A minor in Gerontology is sponsored through the College of Human Development and Education (<https://www.ndsu.edu/hde>) 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. There are six basic areas of study. Students should follow the directions provided for each of the areas.

Minor Requirements

Gerontology Minor

Minor Requirements

Required Credits: 19

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		
HDFS 182	Wellness and Aging	3
Area Four: Macrosystems		
Select one from the following:		3
HDFS 481	Gender and Aging	
HDFS 482	Family Dynamics of Aging	
Area Five: Internship/Practicum		
A minimum of 4 credits is required for area five.		4
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 481	Gender and Aging (the course not used for Area Four: Macrosystems may be used as an elective)	
or HDFS 482	Family Dynamics of Aging	
Total Credits		19

Minor Requirements and Notes

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

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 Arabic, French, German, and Spanish. Additional language study is available through the Tri-College University in languages such as Norwegian, 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. 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 sophomore standing with a minimum grade-point average of 2.50. Eligible students also must have initiated advanced level course work in their academic major and completed the first year or equivalent of their foreign language study. Additional information about the International Studies major and curriculum requirements are available through the department of a student's academic major, the college International Studies adviser, the Department of Modern Languages (<https://www.ndsu.edu/modernlanguages>), and the Office of International Programs (<https://www.ndsu.edu/international>).

Major Requirements

Major: International Studies

Offered as a secondary major only; students must select a primary major before adding International Studies.

Required Credits: 32

International Studies Core Requirements

Group A:		
INTL 110	Introduction to International Studies	3
Group B:		
Select two of the following:		6
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
GEOG 161	World Regional Geography	
POLS 220	International Politics	
POLS 225	Comparative Politics	
Group C:		
Select one of the following:		3
HIST 101	Western Civilization I	
HIST 102	Western Civilization II	
Group D:		
Select one of the following:		3
ANTH 111	Introduction to Anthropology	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World *	

Electives

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.

Select 9 credits from the following:		9
Agriculture:		
AGEC 220	World Agricultural Development	
ECON 456	History of Economic Thought	3
ECON 461	Economic Development	

ECON 472	International Trade	
PLSC 110	World Food Crops	
Business Administration:		
MRKT 372	Global Retailing	
BUSN 340	International Business	3
BUSN 341	Global Business Environment	3
BUSN 440	International Business Law	
FIN 440	International Finance	
MGMT 440	International Management	
MRKT 440	International Marketing	
Architecture:		
ARCH 321	History and Theory of Architecture I	
ARCH 322	History of Architecture II	
ARCH 474	International Design Studio	6
LA 322	History of Landscape Architecture	
Human Development and Education:		
ADHM 372	Global Retailing	
ADHM 410	Dress in World Cultures	
ADHM 411	Food and World Cultures	
ADHM 485	Global Consumer Analysis	3
HDFS 475	Children and Families Across Cultures	
HNES 355	International Health	3
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	3
ANTH 444	Peoples of the Pacific Islands	
ANTH 453	Magic and Religion	
ANTH 455	Language and Expressive Culture	3
ANTH 459	Global Cultural Heritage	3
ART 111	Introduction to Art History	3
ART 210	Art History I	
ART 211	Art History II	
COMM 216	Intercultural Communication	3
ENGL 209	Introduction to Linguistics	
ENGL 240	World Literature Masterpieces	
ENGL 330	British and American Women Writers	
ENGL 335	Multicultural Writers	
ENGL 455	International Technical Writing	3
EMGT 425	International Emergency Management	3
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	3
HIST 281	History of East Asia from 1600	3
HIST 381	Australia & New Zealand	
HIST 435	World Environmental History	3
HIST 440	The Ottoman Empire	
HIST 450	Ancient History	
HIST 451	Medieval History	
HIST 456	Europe 1815-1914	

HIST 457	Europe Since 1914	
HIST 464	Imperial Spain	3
HIST 465	Germany since 1750	3
HIST 467	History Of Russia II	3
HIST 470	Modern Latin America I	
HIST 471	Modern Latin America II	
HIST 473	Colonial Mexico	
HIST 474	Modern Mexico	
HIST 480	History of Modern China from 1600	3
HIST 481	History of Japan	3
HIST 482	Vietnam: 125 Years of Conflict	3
HIST 485	Cultural Exchange and the Making of the Modern World	3
FREN 340	The French-Speaking World	3
FREN 345	Women in French Literature	
FREN 410	French Literature & Culture before 1800	
FREN 412	French Literature & Culture since 1800	
GERM 220	German Culture & Society	3
SPAN 330	Introduction to Spanish Civilization	
SPAN 331	Introduction to Spanish American Civilization	3
SPAN 440	Traditions in Spanish American Literature	
SPAN 441	Contemporary Spanish American Literature	3
SPAN 442	Introduction to Chicano Literature	3
SPAN 443	Spanish American Women Writers	3
SPAN 450	Traditions in Spanish Literature	
SPAN 451	Contemporary Spanish Literature	3
SPAN 453	Spanish Women Writers	3
MUSC 340	Music History I	
MUSC 341	Music History II	
PHIL 215	Contemporary Moral Issues	3
PHIL 321	Ancient Philosophy	
PHIL 322	Medieval Philosophy	
PHIL 323	Modern Philosophy	
PHIL 370	Social and Political Philosophy	3
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	Current Topics in International Law	3
POLS 450	Politics of the Developing Countries	
POLS 452	Comparative Political Economy	3
POLS 451	Politics of the Industrialized Countries	
SOC 443	International Disasters	3
THEA 115	World Film	3
THEA 280	World Theatre	3
Science and Mathematics:		
BIOL 124	Environmental Science	
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		
To 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.		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.		5
Integrative Senior Project Requirement		
INTL 488	Integrated Senior Project Proposal	1
INTL 489	Integrative Senior Project	2
Total Credits		150

* These courses may be used for Group C if they were not used for Group B.

Major Requirements and Notes

- The General Education component is to be completed with the student's choice of primary major.
- **Courses for the International Studies core may not double count as general education for the primary major.** However, courses meeting general education requirements for global perspectives and cultural diversity may count as electives.
- 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>).

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.

Minor Requirements

Logistics Management Minor

Minor Requirements

Required Credits: 19

A grade of 'C' or better is required in all courses used to satisfy the minor.

Code	Title	Credits
Core Courses		
MGMT 320	Foundations of Management	3
MGMT 461	Supply Chain Management	3
BUSN 491	Seminar	1
AGEC 378	Introduction to Transportation & Logistics	3
IME 470	Operations Research I	3
IME 480	Production and Inventory Control	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 be accepted into this minor program, students must have a cumulative institutional GPA of 2.50 and at least junior standing (60 credits).
- 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.
- If the cumulative GPA falls below the 2.50 after acceptance into the program, the student will not be allowed to register for College of Business courses until the cumulative GPA returns to 2.50 or above.
- Approval for a minor does not guarantee enrollment in specific courses.
- This minor must be officially declared (<https://www.ndsu.edu/business/majorsminorslist/minors>); see the College of Business for information.
- A minimum of 8 credits must be taken at NDSU.

Natural Resources Management

With increasing human pressure and a growing need to balance competing demands, our world needs new and better ways to manage society's impacts on the environment. The Natural Resources Management program prepares students for challenging careers requiring the sustainability perspective and global social perspective necessary for examining and solving complex natural resources management problems. Our goal is the highest and best societal uses of natural resources while maintaining the integrity of life-sustaining socio-ecological systems. Career opportunities abound in federal, state and local government, the private sector, non-profit conservation and environmental organizations, as well as higher education and research.

An interdisciplinary major in NRM leads to a Bachelor of Science (B.S.) degree. Students benefit from faculty engagement from the various colleges across the university in the coordination of the program, classroom teaching and advising.

During the first four semesters of the NRM program, students complete a broad foundation of core courses in the social, biological, and physical sciences. The second half of the program offers students the opportunity to focus on a specific area of interest (emphasis). NRM offers six emphasis areas, each allowing students the flexibility to select courses for specialized career preparation.

- **Biotic Resources Science:** deals with basic scientific principles that govern the interrelationship between biotic (e.g., plants, animals) and abiotic factors (e.g., climate, soils) in major ecosystems and the use of these principles for environmentally sound management of both natural and agro-ecosystems.
- **Environmental Communication:** is designed for environmentally oriented students preparing for careers in communication fields such as journalism, public relations, broadcast media and the internet.
- **Natural Resources Economics:** prepares students for management, administrative, regulatory, and policy positions that require a broad understanding of natural resources management and allocation.
- **Physical/Earth Resources Science:** leads to an understanding of the physical and chemical aspects of ecosystems. Topics of study include hydrology, water management and quality, waste management, soil properties, energy resources and land-use management.
- **Pollution Control:** focuses on the principles and practices of managing natural resources for pollution control. Topics include the technical aspects of pollution as they relate to water, air/solids, earth/soils, and the impact of environmental pollution on biotic factors. Students interested in this emphasis are strongly urged to complete College Algebra before entering the NRM program.
- **Social Sciences:** concentrates on human factors (social, political, anthropological) in environmental management and environmental disaster management, while recognizing constraints and opportunities presented by physical and biological factors.

Major Requirements

Major: Natural Resources Management

Degree Type: B.S.

Required Degree Credits to Graduate: 128

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
AGRI 189	Skills for Academic Success (Students transferring in 24 or more credits do not need to take AGRI 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
One Course in Upper Level Writing: Select one of the following:		
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 324	Writing in the Sciences	

ENGL 358	Writing in the Humanities and Social Sciences	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R):		
STAT 330	Introductory Statistics	3
Science & Technology (S):		
CHEM 121 & 121L	General Chemistry I and General Chemistry I Laboratory	4
GEOL 105	Physical Geology	3
NRM 225	Natural Resources & Agrosystems	3
Humanities & Fine Arts (A): Select from current general education list		6
Social & Behavioral Sciences (B):		
ECON 201	Principles of Microeconomics	3
Select one of the following:		3
POLS 110	Introduction to Political Science	
SOC 110	Introduction to Sociology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
ANTH 111	Introduction to Anthropology	
Wellness (W): Select from current general education list		2
Cultural Diversity (D): Select from current general education list		
Global Perspectives (G):		
GEOL 105	Physical Geology	3
Total Credits		40

Major Requirements

Code	Title	Credits
General Education Requirements		40
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
BIOL 364	General Ecology	3
ECON 481	Natural Resource Economics	3
HIST 434	Environmental History	3
NRM 150	Natural Resource Management Orientation	1
NRM/SOIL 264	Natural Resource Management Systems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
POLS 115 or POLS 215	American Government Problems and Policies In American Government	3
RNG 452 or GEOG 455	Geographic Information Systems in Range Survey Introduction to Geographic Information Systems	3
Select one of the following:		3
SOC 431	Environmental Sociology	
POLS 360	Principles of Public Administration	
POLS 422	State and Local Politics	
POLS 442	Global Policy Issues	
ANTH 462	Anthropology and the Environment	
EMGT 261	Disaster Preparedness	
EMGT 262	Disaster Mitigation	
EMGT 263	Disaster Response	
EMGT 264	Disaster Recovery	
SOIL 210	Introduction to Soil Science	
NRM Emphasis Area: Students must select one of the six NRM emphasis areas to complete the major. See below.		38

Degree Requirements: Potential of a minimum of 12 credits to reach 128. 12

Total Credits 123

Natural Resources Management Emphasis Areas

- Select and complete one emphasis area as part of the Natural Resources Management major.
- Declaring an Emphasis- Students should formally declare an emphasis area with the Office of Registration & Records (<https://www.ndsu.edu/registrar>) by the beginning of their junior year. The emphasis area is recorded on the academic transcript with the degree.

Biotic Resources Science

Code	Title	Credits
Required. Select two of the following:		6
CHEM 122	General Chemistry II	
CHEM 240	Survey of Organic Chemistry	
RNG 336	Introduction to Range Management	
RNG/NRM 453	Rangeland Resources Watershed Management	
Select a minimum of 32 credits from the approved electives list below for Biotic Resources:		32
BOT 314	Plant Systematics	
RNG 456	Range Habitat Management	
SOIL 217	Introduction to Meteorology & Climatology	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
PLSC 219	Introduction to Prairie & Community Forestry	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
PLSC/BOT/ZOO 315	Genetics	
PLSC/BOT/ZOO 315L	Genetics Laboratory	
RNG/NRM 454	Wetland Resources Management	
BOT/RNG 460	Plant Ecology	
MICR 202	Introductory Microbiology	
ZOO 450	Invertebrate Zoology	
ZOO 454	Herpetology	
ZOO 458	Mammalogy	
PLSC 355	Woody Landscape Plants	
RNG/BOT 450	Range Plants	
BOT 380	Plant Physiology	
RNG 458	Grazing Ecology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ZOO 462	Physiological Ecology	
ZOO 475	Conservation Biology	
ZOO 477	Wildlife and Fisheries Management Techniques	
ENT 350	General Entomology	
ZOO 360	Animal Behavior	
ZOO 452	Ichthyology	
ZOO 456	Ornithology	
PLSC 323	Principles of Weed Science	
RNG 326	Modeling of Range and Agro-Ecosystems	

Total Credits 38

Physical/earth Resources Science

Code	Title	Credits
Required:		

CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
GEOL 412 or SOIL 444	Geomorphology Soil Genesis and Survey	3
Select a minimum of 27 credits from the approved electives list below for Physical/Earth Resources Science:		27
ABEN 464	Resource Conservation and Irrigation Engineering	
ASM 354	Electricity and Electronic Applications	
RNG 336	Introduction to Range Management	
GEOL 105L	Physical Geology Lab	
GEOL 412	Geomorphology	
SOIL 444	Soil Genesis and Survey	
NRM 401	Urban-Ecosystem Management	
RNG/NRM 454	Wetland Resources Management	
NRM 420	Scenarios in Natural Resources Management	
PHYS 211	College Physics I	
CE 204	Surveying	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 410	Soils and Land Use	
MICR 202	Introductory Microbiology	
SOIL 465	Soil And Plant Analysis	
GEOL/CHEM 428	Geochemistry	
ASM 225	Computer Applications in Agricultural Systems Management	
PHYS 211L	College Physics I Laboratory	
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
GEOL 414	Hydrogeology	
MICR 202L	Introductory Microbiology Lab	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
ASM 454	Principles and Application of Precision Agriculture	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 351	Soil Ecology	
SOIL 433	Soil Physics	
SOIL 447	Microclimatology	
SOIL 480	Soils and Pollution	

Total Credits **38**

Environmental Communication

Code	Title	Credits
Required:		
COMM 112	Understanding Media and Social Change	3
COMM 200	Introduction to Media Writing	3
NRM 421	Environmental Outreach Methods	3
COMM 485	Risk and Crisis Communication	3
Select one of the following:		4
COMM/POLS/CJ 325	Applied Research Methods	
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	
Select a minimum of 22 credits from the approved electives list below for Environmental Communication:		22
COMM 245	Principles of Broadcast Production	
COMM 260	Introduction to Web Design	

COMM 301	Rhetorical Traditions
NRM 420	Scenarios in Natural Resources Management
COMM 433	Legal Communication
COMM 442	Digital Media and Society
COMM 445	Advanced Broadcast Production
COMM 472	Public Relations Campaigns
COMM 402	Contemporary Rhetoric
COMM 261	Introduction to Web Development
COMM 310	Advanced Media Writing
COMM 362	Principles of Design For Print
COMM 383	Organizational Communication I
NRM 421	Environmental Outreach Methods
COMM 436	Issues in Mass Communications
COMM 443	Mass Media and Public Opinion
COMM 450	Issues in Communication
COMM 431	Communication Ethics and Law

Total Credits**38****Pollution Control**

Code	Title	Credits
Required:		
CE 309	Fluid Mechanics	3
CE 370	Introduction to Environmental Engineering	3
CE 408	Water Resources and Supply	3
CHEM 122 & 122L	General Chemistry II and General Chemistry II Laboratory	4
MATH 165	Calculus I	4
ME 221	Engineering Mechanics I	3
ME 222	Engineering Mechanics II	3
Select a minimum of 15 credits from the approved electives list below for Pollution Control:		15
Air/Solids:		
CE 472	Solid Waste Management	
SOIL 217	Introduction to Meteorology & Climatology	
SOIL 447	Microclimatology	
Biotic:		
ABEN 499	Special Topics	
BOT 380	Plant Physiology	
BOT/RNG 460	Plant Ecology	
MICR 350	General Microbiology	
MICR 350L	General Microbiology Lab	
ZOO 470	Limnology	
ZOO 476	Wildlife Ecology and Management	
ZOO 477	Wildlife and Fisheries Management Techniques	
Earth/Soils:		
CHEM 240	Survey of Organic Chemistry	
GEOL 300	Environmental Geology	
SOIL 322	Soil Fertility and Fertilizers	
SOIL 351	Soil Ecology	
SOIL 410	Soils and Land Use	
SOIL 433	Soil Physics	
SOIL 444	Soil Genesis and Survey	
SOIL 447	Microclimatology	

SOIL 465	Soil And Plant Analysis
SOIL 480	Soils and Pollution
Water:	
ABEN 464	Resource Conservation and Irrigation Engineering
CE 410	Water and Wastewater Engineering
CE 421	Open Channel Flow
CE 477	Applied Hydrology
CE 478	Water Quality Management
GEOL 414	Hydrogeology
RNG/NRM 453	Rangeland Resources Watershed Management
GEOL/CHEM 428	Geochemistry

Total Credits**38****Natural Resources Economics**

Code	Title	Credits
Required:		
MATH 146 or MATH 165	Applied Calculus I Calculus I	4
ECON 341	Intermediate Microeconomics	3
STAT 331	Regression Analysis	2
Select a minimum of 29 credits from the approved electives list below for Natural Resources Economics:		29
AGEC 339	Quantitative Methods & Decision Making	
AGEC 375	Applied Agricultural Law	
ECON 202	Principles of Macroeconomics	
ECON 343	Intermediate Macroeconomics	
ECON 456	History of Economic Thought	
ECON 470	Public Economics	
ECON 480	Industrial Organization	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 420	Scenarios in Natural Resources Management	
POLS 220	International Politics	
POLS 442	Global Policy Issues	
POLS 452	Comparative Political Economy	
SOC 403	Sociology of The Great Plains	
SOC 439	Social Change	
AGEC 347	Principles of Real Estate	
AGEC 484	Agricultural Policy	
COMM 315	Small Group Communication	
ECON 324	Money and Banking	
ECON 410	Econometrics	
ECON 461	Economic Development	
ECON 472	International Trade	
HNES 427	Leisure And Society	
NRM 402	River and Stream Resource Management	
NRM 421	Environmental Outreach Methods	
POLS 360	Principles of Public Administration	
POLS 444	International Law	
POLS 453	Environmental Policy and Politics	
SOC 431	Environmental Sociology	

Total Credits**38**

Social Sciences

Code	Title	Credits
Required:		
SOC 405	Community Development	3
SOC 340 & SOC 341	Social Research Methods and Social Research Methods Laboratory	4
Select a minimum of 31 credits from the approved electives list below for Social Science:		31
ANTH 204	Archaeology and Prehistory	
ANTH 206	Introduction to Cultural Anthropology: Peoples of the World	
ANTH 446	Latin America & Carribean: Afro-Latino/as, Gender, Indigeneity	
CJ 201	Introduction to Criminal Justice	
EMGT 261	Disaster Preparedness	
EMGT 263	Disaster Response	
EMGT 414	Spatial Analysis in Emergency Management	
EMGT 461	Business Continuity and Crisis Management	
EMGT 481	Disaster Analysis	
GEOG 262	Geography of North America	
NRM 401	Urban-Ecosystem Management	
NRM 421	Environmental Outreach Methods	
POLS 225	Comparative Politics	
POLS 422	State and Local Politics	
SOC 403	Sociology of The Great Plains	
SOC 422	Development Of Social Theory	
or ANTH 480	Development of Anthropological Theory	
SOC 418	Social Psychology	
SOC 431	Environmental Sociology	
SOC 443	International Disasters	
ANTH 205	Human Origins	
ANTH 433	Apes and Human Evolution	
ANTH 462	Anthropology and the Environment	
ANTH 481	Qualitative Methods in Cultural Anthropology	
EMGT 101	Emergencies, Disasters, and Catastrophes	
EMGT 262	Disaster Mitigation	
EMGT 264	Disaster Recovery	
EMGT 463	Voluntary Agency Disaster Services	
ENGL 474	Native American Literature	
NRM 420	Scenarios in Natural Resources Management	
POLS 215	Problems and Policies In American Government	
POLS 360	Principles of Public Administration	
POLS 453	Environmental Policy and Politics	
SOC 439	Social Change	
SOC 465	Applied Demographics	
Total Credits		38

Degree Notes:

- **Acceptable Substitutions:** The following courses are accepted as electives in all emphasis areas: NRM courses (may not be double-counted with the NRM Core); a maximum of 3 credits of Field Experience (396/496); a maximum of 3 credits of Co-op Ed (397/497). **All other substitutions require NRM advisor approval and a substitution form to be completed and submitted to the Office of Registration and Records** (<https://www.ndsu.edu/registrar>).

Minor Requirements

Natural Resources Management Minor

Minor Requirements

Required Credits: 19

Code	Title	Credits
Core Courses		
NRM 150	Natural Resource Management Orientation	1
NRM 225	Natural Resources & Agrosystems	3
NRM 431	National Environmental Policy Act & Environmental Impact Assessment	3
Interdisciplinary Courses		
Select four of the following:		12
ASM/NRM/SOIL 264	Natural Resource Management Systems	
BIOL/ZOO 364	General Ecology	
BOT/RNG 460	Plant Ecology	
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	
NRM 421	Environmental Outreach Methods	
NRM/RNG 453	Rangeland Resource/Watershed Management	
RNG 336	Introduction to Range Management	
SOIL 210	Introduction to Soil Science	
SOIL 217	Introduction to Meteorology & Climatology	
SOC 431	Environmental Sociology	
POLS 453	Environmental Policy and Politics	
RNG 452	Geographic Information Systems in Range Survey (RNG 452 changing to NRM 452 GIS in NRM)	
SOIL 410	Soils and Land Use	
SOC 405	Community Development	
ZOO 476	Wildlife Ecology and Management	

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.

Women and Gender Studies

www.ndsu.edu/wgs/

The goals of Women and Gender Studies include: Examining the contributions of all genders to aspects of society; exploring the intersections of race, class, sexual orientation, age, and physical ability with gender both globally and nationally; investigating the heritage, challenges and concerns of women and men; and providing a newer and broader understanding of women and men in all fields.

A Women and Gender Studies program provides the benefits of a liberal arts education with an emphasis on critical thinking, writing, and organizational skills, making oral presentations, and expands the traditional acknowledgement that a liberal education produces well-rounded individuals. There also are multiple practical applications of a Women and Gender Studies major. The interdisciplinary curriculum, with an emphasis on equality and diversity, prepares students for leadership in the workplace, politics, health care, sport, family life, education, and law.

Women and Gender Studies Major

The major consists of 36 credits, including a 15 credit core, six hours of general Women and Gender Studies elective classes, and 15 hours of topic-intensive work (Women and Liberal Arts; Women, Families, and Health; and Women, Work, and Public Policy). Many of the courses in the topic-

intensive electives are at Concordia College (<https://www.concordiacollege.edu/academics/departments-programs/womens-studies-2>) and Minnesota State University Moorhead (<https://www.mnstate.edu/women>).

Women and Gender Studies Minor

The Women and Gender Studies minor is an interdisciplinary program appropriate as a complement to various majors. This minor is particularly useful in acquiring perspectives that complement traditional studies for developing leadership roles or for pursuing careers that involve concerns about gender.

Major Requirements

Major: Women & Gender Studies

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

Required Degree Credits to Graduate: 122

Arts, Humanities, and Social Sciences Degree Requirements

Bachelor of Science (B.S.) Degree - The completion of a minor program of study is required.

Bachelor of Arts (B.A.) Degree - Second year language proficiency required.

General Education Requirements

Code	Title	Credits
First Year Experience (F):		
UNIV 189	Skills For Academic Success (Students transferring in 24 or more credits do not need to take UNIV 189.)	1
Communication (C):		
ENGL 110	College Composition I	3
ENGL 120	College Composition II	3
Select one of the following:		3
ENGL 320	Business and Professional Writing	
ENGL 321	Writing in the Technical Professions	
ENGL 323	Creative Writing	
ENGL 324	Writing in the Sciences	
ENGL 325	Writing in the Health Professions	
ENGL 357	Visual Culture and Language	
ENGL 358	Writing in the Humanities and Social Sciences	
ENGL 459	Researching and Writing Grants and Proposal	
COMM 110	Fundamentals of Public Speaking	3
Quantitative Reasoning (R): Select from current general education list		3
Science & Technology (S):		10
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. Select from current general education courses		
Humanities & Fine Arts (A):		
WGS 110	Introduction to Women's Studies	3
Select from current general education courses		3
Social & Behavioral Sciences (B):		
SOC 412	Sociology of Gender	3
Select from current general education courses		3
Wellness (W): Select from current general education list		2
Cultural Diversity (D):		
WGS 110	Introduction to Women's Studies	3
Global Perspectives (G): Select from current general education list		
Total Credits		40

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 for the Bachelor of Fine Arts degree, the Bachelor of Music degree, Bachelor of Landscape Architecture degree, and the Bachelor of Science in Architecture degree:

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, ENGT, POLS, SOC, or WGS		
Area Three: Fine Arts		3
ARCH, ART, ENVD, LA, MUSC, or THEA		
Total Credits		9

Major Requirements

Code	Title	Credits
General Education Requirements		40
AH&SS College Requirement		9
Women & Gender Studies Major		
WGS 350	Perspectives in Women's Studies	3
WGS 489	Internship/Capstone	3
SOC 424	Feminist Theory and Discourse	3
Electives: Select 6 credits from the following:		6
COMM 412	Gender and Communication	
ENGL 454	Language Bias	
HDFS 448	Issues In Sexuality	
SOC 219	Sociology of Sexual Behavior (MSUM)	
SOC 308	Social Gerontology (MSUM)	
SOC 310	Dominant-Subordinate Group Relations (MSUM)	
WGS 112	Introduction to Masculinities	
WGS 491	Seminar (10 hours = 1 credit)	
WGS 496	Field Experience	
WS 407	Inclusive Science: Women, Gender, and Science (MSUM)	
SOC 415	Media and Diverse Identities (MSUM)	
Topic Electives: Students must take classes in at least 3 topic areas.		15
Topic Area 1: Women, Work and Public Policy:		
COMM 383	Organizational Communication I	
ENGL 459	Researching and Writing Grants and Proposal	
HDFS 353	Children, Families and Public Policy	
HDFS 468	Families and Work	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
SOC 235	Cultural Diversity	
SOC 410	Social Inequality	
SOC 439	Social Change	
Topic Area 2: Women and Liberal Arts:		
ANTH 303	Cross-Cultural Gender (MSUM)	
COMM 216	Intercultural Communication	
ENGL246	Women in Literature (MSUM)	

ENGL 248	Intro to American Ethnic Literature (MSUM)	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENG 365	Writing of Women (CC)	
FREN 223	Race, Gender and Power in the Francophone World (CC)	
FREN 345	Women in French Literature	
HIST 259	Women in European History 1400-1800	
HIST 344	Women and Development: The Asian Experience (CC)	
SPAN 325	Hispanic Women Writers (CC)	
THR 323	Women and Theatre (CC)	
Topic Area 3: Women, Families and Health:		
COMM 380	Health Communication I	
HDFS 230	Life Span Development	
HDFS 242	Couples, Marriages and Families	
HDFS 353	Children, Families and Public Policy	
HDFS 462	Methods of Family Life Education	
HDFS 475	Children and Families Across Cultures	
PHRM 170	Common Medicines & Diseases	
PSYC 210	Human Sexuality	
PSYC 250	Developmental Psychology	
SOC 416	Sociology Through Literature (M)	
SOC 417	Sociology of the Family	
SOC 439	Social Change	
Degree Requirements: Potential of 43 credits to reach 122		43
Total Credits		122

Minor Requirements

Women & Gender Studies Minor

Minor Requirements

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
AHSS Courses - at least 3 credits from this area:		
COMM 412	Gender and Communication	
ENGL 330	British and American Women Writers	
ENGL 331	Contemporary Women Writers	
ENGL 335	Multicultural Writers	
ENGL 454	Language Bias	
ENGL 459	Researching and Writing Grants and Proposal	
HIST 259	Women in European History 1400-1800	
POLS 350	Gender Issues and the Law	
POLS 351	Women and Politics	
SOC 235	Cultural Diversity	
SOC 412	Sociology of Gender	
SOC 417	Sociology of the Family	
SOC 424	Feminist Theory and Discourse	
SOC 439	Social Change	

HD&E Courses - at least 3 credits from this area

HDFS 230	Life Span Development
HDFS 242	Couples, Marriages and Families
HDFS 353	Children, Families and Public Policy
HDFS 448	Issues In Sexuality
HDFS 468	Families and Work
HDFS 475	Children and Families Across Cultures
Other Available Courses:	
PSYC 210	Human Sexuality
PSYC 250	Developmental Psychology
WGS 112	Introduction to Masculinities
WGS 491	Seminar

Total Credits**18****Minor Requirements and Notes**

- A minimum of 8 credits must be taken at NDSU

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* **Program Available Online**

Accountancy

Program and Application Information

Department Chair:

Dr. Herbert Snyder

M. Acc. Director:

Ms. Cynthia Grothe, CPA, MBT

Email:

cynthia.grothe@ndsu.edu

Department Location:

Barry Hall 200

Department Phone:

(701) 231-5166

Department Web Site:

https://www.ndsu.edu/business/graduate_programs/macc/

Application Deadline:

Fall Semester - March 1 Spring Semester - October 1 Summer Semester - March 1 Applications must be received by the deadline in order to qualify for assistantships and scholarships. Applications received after the deadline will be considered if space allows.

Degrees Offered:

M.Acc.

Test Requirement:

GMAT 520 or GRE

English Proficiency Requirements:

TOEFL iBT 79 IELTS 6.5

Program Description

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. Students without an undergraduate accounting degree may be conditionally

admitted to the program if they have some of the core undergraduate courses and will be required to take the remaining core undergraduate courses in addition to the graduate courses.

The Master of Accountancy (M.Acc.) program at NDSU 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. Our approach to learning combines case study and applied learning in a collaborative environment. The focus of the program is to develop a student's analytical skills while providing students with in-depth accounting knowledge and skills. Students will be prepared to identify accounting problems, research the problem and possible solutions through using on-line and other databases, and present a recommended action. The learning environment also provides students the opportunity to draw from the experiences of fellow students from diverse backgrounds as well as interact with corporate, public accounting, government, and not-for-profit accounting discipline leaders

Through the College of Business, North Dakota State University's M.Acc program is fully accredited by AACSB International (<http://aacsb.edu>), the premier accrediting agency in business administration and accounting.

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 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 520.

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.

Degree Requirements

The total course requirements necessary to complete the M.Acc. 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. See para. C.5. of the Admission Requirements. A student with an academic background in accounting will need to take 10 graduate-level courses (30 semester credit hours) and generally complete the degree in two or three semesters depending on the number of courses a student desires to take in a semester. Students are welcome to pursue the degree on a part-time or a full-time basis.

The graduate course work for the M.Acc. 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 courses that includes fraud examination, taxes, cost management, auditing, international financial reporting standards, and advanced financial accounting. Finally, the student must take one non-accounting elective from a list that includes courses on human resource management, international management, and organizational communication.

Courses Required

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
COMM 783	Advanced Organizational Communication I	
MGMT 640	International Management	
MGMT 650	Human Resource Management	
MGMT 651	Negotiation and Alternative Dispute Resolution	
MGMT 671	Leading the Nonprofit Organization	
MGMT 750	Advanced Organizational Behavior	
Total Credits		30

¹ Students cannot take the 600-level course if they took the 400-level course

Notes

- Students must complete a minimum of 15 credits at the 700-level.
- Summer courses are offered if sufficient students register to take the class.

You must have completed the following undergraduate courses or their equivalent.

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

Margaret (Peggy) Andersen, Ph.D.

Indiana University, 1989
Field: Accounting

William "Bud" Bowlin, Ph.D.

University of Texas at Austin, 1984
Field: Accounting

Jun "Jeffrey" Chen, Ph.D.

University of North Carolina at Charlotte, 2014
Field: Finance

James W. Clifton, M.Acc., CPA

University of North Dakota, 1988
Field: Accounting

Thomas D. Dowdell, Ph.D.

Temple University, 2004
Field: Accounting

Yongtao "David" Hong, Ph.D.

Drexel University, 2008
Field: Accounting

Fariz Huseynov, Ph.D.

University of Memphis, 2009
Field: Finance

Bonnie Klamm, Ph.D., CPA

Virginia Commonwealth UniversityRichmond, 1999

Field: Accounting Information System

Supavich "Fone" Pengnate, Ph.D.

Oklahoma State University, 2013

Field: Management Information Systems

Michael J. Peterson, Ph.D.

The University of Iowa, 2002

Field: Accounting

Frederick Riggins, Ph.D.

Carnegie Mellon University, 1994

Field: Management Information Systems

Herbert Snyder, Ph.D.

Syracuse University, 1994

Field: Auditing, Forensic Accounting

Ruilin Tian, Ph.D.

Georgia State University, 2008

Field: Risk Management and Insurance

Alex Young, Ph.D.

Duke University, 2015

Field: Accounting

Limin Zhang, Ph.D.

University of Arizona, 2005

Field: Management Information Systems

Wei "David" Zhang, Ph.D.

Syracuse University, 2001

Field: Business Administration/Finance

Jill Zuber, Ph.D., CPA

University of Arkansas, 2007

Field: Accounting

Agribusiness and Applied Economics

Program and Application 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/
Application Deadline:	March 1 to be considered for an assistantship
Degrees Offered:	M.S.
Test Requirement:	GRE (for assistantship consideration)
English Proficiency Requirements:	TOEFL iBT 79 IELTS 6.5

Program Description

The Department of Agribusiness and Applied Economics offers two Master of Science degrees: (1) Agribusiness and Applied Economics, and (2) International Agribusiness. Graduates of both programs are prepared to analyze important agricultural development, finance, marketing, policy, production, resource, international trade, and transportation and logistical issues facing society.

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. (A favorable faculty to student ratio is maintained.) The department has an excellent placement record with national and international agricultural and business firms, as well as government agencies.

Admission Requirements

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.

It is desirable that students begin their program in the fall semester, although students may also begin their program of study in January. The application for admission should be received by the Graduate School by March 1 if the student wishes to be considered for financial assistance. International students are advised to submit applications no later than March 31 to ensure VISA documents will be completed for a fall matriculation.

Financial Assistance

Application for financial assistance should be made to the department at the same time as application to the graduate school. Applicants to graduate school who are accepted in less than full standing will not be eligible for an assistantship until their status changes to full standing. Granting assistantships depends on academic performance, departmental needs, and availability of assistantships. Application forms may be obtained from the department.

Students pursuing a Master of Science in Agribusiness and Applied Economics (thesis option or comprehensive study option) must complete all core courses. Students select elective courses (with approval of the 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. It is required that students have competence in calculus, multiple regression analysis, and intermediate microeconomics.

M.S. in Agribusiness and Applied Economics

Required

AGEC 701	Research Philosophy	1
ECON 710	Advanced Econometrics	3
AGEC 739	Analytical Methods for Applied Economics	3
AGEC 741	Advanced Microeconomics	3
AGEC 797	Master's Paper	1-10
or AGECE 798	Master's Thesis	

Thesis Option

- Minimum of 16 credits of approved graduate-level course work
- 6 to 10 credits of AGECE 798 (Thesis)
- Minimum of 30 credits of course work and thesis credits

Comprehensive Study Option

- Minimum of 7 credits of quantitative courses (including ECON 610, ECON 710, AGECE 739, AGECE 711 or other approved quantitative courses)
- Minimum of 21 credits of approved graduate-level course work
- 2 to 4 credits of AGECE 797 (Comprehensive Study)
- Minimum of 30 credits of course work and comprehensive study credits

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Robert S. Herren, Ph.D.

Duke University, 1975

Research Interests: Economic History, Labor, Money and Banking

Jeremy Jackson, Ph.D.

Washington University in St. Louis, 2008

Research Interests: Microeconomics, Political Economy, Public Finance

Ryan Larsen, Ph.D.

Texas A&M University, 2009

Research Interests: Agricultural Finance, Risk Management

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Gregory McKee, Ph.D.

University of California, Davis, 2006

Research Interests: Industrial Organization, Agribusiness, Cooperatives

Dragan Miljkovic, Ph.D.

University of Illinois, 1996

Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

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

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

David M. Saxowsky, J.D.

The Ohio State University, 1979

Research Interests: Agricultural Law

Saleem Shaik, Ph.D.

University of Nebraska, 1998

Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Cheryl J. Wachenheim, Ph.D.

Michigan State University, 1994

Research Interests: Agribusiness

Tom Wahl, Ph.D.

Iowa State University, 1989

Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.

University of Texas at Dallas, 2011

Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Agricultural Education

Program and Application Information

Department Chair::	Dr. William Martin
Coordinator::	Dr. Adam Marx
Department Location:	School of Education, FLC 210
Department Phone:	(701) 231-7921
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.
Degrees 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.

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.

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.

Admission Requirements

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.

Degree Requirements

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.

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
Choose from the following:		
H&CE 724	Program Development In Vocational Education	
H&CE 740	Vocational Philosophy and Policy	

H&CE 743	SAE/Adult Programs
H&CE 746	International Extension
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
H&CE 798	Master's Thesis

Total Credits
30**Adam A. Marx, Ph.D.**

University of Missouri, 2014

Research Interests: Adolescent Career Decision-Making, Student Engagement, Teacher Development

Agricultural and Biosystems Engineering

Program and Application Information

Department Chair:

Dr. Sreekala Bajwa

Graduate Coordinator:

Dr. Shafiqur Rahman

Email:

ndsu.ABENgrad@ndsu.edu

Department Location:

Agricultural and Biosystems Engineering Building

Department Phone:

(701) 231-7261

Department Web Site:

www.ndsu.edu/aben/

Application Deadline:

Applications are accepted for fall, spring and summer semester admission. 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.

Degrees 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.

Admission Requirements

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. Of these, 20-24 credit hours are from course work, while 6-10 credit hours are typically provided for a master's thesis. A Plan of Study 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.

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 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:

- 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 and 700-789, or 15 credits if entering with other than an ABEN B.S.
- It is expected that one or more journal articles will be submitted for publication prior to the award of the degree.

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.

Sreekala G. Bajwa, Ph.D.

University of Illinois at Urbana-Champaign, 2000

Research Interests: Remote Sensing, Precision Agriculture, Unmanned Aerial Systems, Bio-composites

Thomas Bon, Ph.D.

North Dakota State University, 2003

Research Interests: Machine Systems, Electronics and Instrumentation

Ganesh Bora, Ph. D.

Kansas State University, 2005

Research Interests: Precision Agricultural Technology; Machinery Systems Engineering; Agricultural Systems Management; Mechanical Harvesting; Agricultural Energy; Instrumentation

Igathinathane Cannayen, Ph.D.

Indian Institute of Technology, 1997

Research Interests: Biomass Harvest, Storage, Collection and Pre-Processing

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

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

Dennis P. Wiesenborn, Ph.D.

Rice University, 1989

Research Interests: Food and Added Value Process Engineering for Food, Biofuels, and Other Bioproducts

Animal Sciences

Program and Application Information

Department Head:

Dr. Greg Lardy

Department Location:

102 Hultz Hall

Department Phone:	(701) 231-7641
Department Web Site:	www.ag.ndsu.edu/ansc/
Application Deadline:	Applications are accepted for fall, spring and summer semester admits.
Degrees Offered:	Ph.D., M.S.
Test Requirement:	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, physiology of reproduction, nutritional physiology, and meat science.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to Animal Sciences programs are fostered.

Admission Requirements

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.

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

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

Neil Dyer, DVM, M.S., Diplomate ACVP

Iowa State University, 1991
Research Interests: Infectious Diseases of Domestic Animals; Public Health

Lauren Hanna, Ph.D.

Texas A & M University, 2013
Research Interest: Animal Genetics; Genomics

Anna T. Grazul-Bilska, Ph.D.

University of Agriculture and Technology, Olsztyn, Poland, 1983
Research Interests: Applied and Basic Aspects of Embryology and Ovarian Function in Livestock Species

Carolyn Hammer, DVM, Ph.D.

Iowa State University, 2003
Research Interests: Equine Preventative Medicine, Growth and Development, Immunology

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

David Newman, Ph.D.

North Dakota State University, 2009
Research Interest: Swine Production with an Emphasis in Meat Sciences, Animal Handling/Welfare, Consumer Acceptance, and Meat Animal Production

Chung S. Park, Ph.D.

Virginia Polytechnic Institute and State University, 1975
Research Interests: Nutritional Regulation of Animal Growth, Mammary Development and Lactation

Dale A. Redmer, Ph.D.

University of Missouri, 1983
Research Interests: Regulation of Ovarian and Uterine Function, Including Angiogenesis and Endocrine Control of Follicular and Placental Development in Farm Animals

Lawrence P. Reynolds, Ph.D.

Iowa State University, 1983
Research Interests: Maternal and Placental Physiology During Pregnancy in Livestock Including Cellular and Molecular Aspects

Jerome W. Schroeder, Ph.D.

North Dakota State University, 1999
Research Interests: Metabolic and Nutritional Relationships of Dairy Cattle Related to Milk Quality and Composition

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

Kimberly Vonnahme, Ph.D.

University of Wyoming, 2003
Research Interests: Nutritional Impacts on Placental Function in Livestock

Sarah A. Wagner, DVM, Ph.D.

Iowa State University, 2003

Research Interests: Food Animal Pharmacology and Therapeutics, Dairy Cattle Health

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

Program and Application Information

Interim Department Chair:	Dr. Miriam Mara
Graduate Coordinator:	Dr. Christina Weber
Department Location:	Minard Hall Rm. 428
Department Phone:	(701) 231-8657
Department Email:	ndsu.anthropology@ndsu.edu
Department Web Site:	www.ndsu.edu/socanth/
Application Deadline:	Applicants who seek funding must apply by February 15 for fall semester and September 15 for spring semester.
Degrees 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.

Admission Requirements

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) or 35 credits (for the paper option), of which 16 must be didactic credits. Core requirements include the following:

- Successfully complete a theory-oriented Anthropology course (such as ANTH 680 Development of Anthropological Theory)
- Successfully complete a methods-oriented Anthropology course (such as ANTH 681 Qualitative Methods in Cultural Anthropology)
- Complete additional coursework to finish the 30-credit requirement (24 for thesis, 26 for paper)
- Complete a research-based thesis or a comprehensive study paper and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Jeffrey T. Clark, Ph.D.

University of Illinois at Urbana-Champaign, 1987

Research Interests: Archaeology, Digital Archaeology, Paleoenvironmental Studies, Archaeological Method/Theory, Heritage and Material Culture, Oceania, North America

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

Lecturers

Travis Kitch, M.S.

North Dakota State University, 2003

Research Interests: Archaeology, Medical Anthropology

Architecture

Program and Application Information

Department Chair:	Dr. David Bertolini
Graduate Coordinator:	Cindy Urness
Department Location:	Renaissance Hall
Department Phone:	(701) 231-6151
Department Web Site:	ala.ndsu.edu/
Application Deadline:	February 1 for fall semester, portfolio required
Degrees 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 Architectural Studies 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 + 32 graduate credits)

- Next accreditation visit: 2018

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.
- 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. (<http://bulletin.ndsu.edu/ad.ndsu.edu/shared/GradSchool/SHARED/Graduate%20School%20Office/Graduate%20Bulletin/15-16%20updates/Updates%20from%20Dept/Checked%20by%20Eliz/Click%20here%20for%20course%20descriptions.%20http://bulletin.ndsu.edu/course-catalog/descriptions/arch>)

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., AIA, Chair

Temple University, 2007

Creative/Research Interests: Architecture and Film Theory, Ideology and Aesthetics

Darryl Booker, M.Arch.

University of Colorado, 1980

Creative/Research Interests: Sustainable Design, Ethics & Built Environment, Appropriate Technology

Michael Christenson, M.Arch.

University of Minnesota, 1997

Creative/Research Interests: Commonalities between Architectural Analysis and Design; Iterative Processes; Parametric Modeling.

David Crutchfield, M.Arch.

University of Texas at Austin, 2004

Creative/Research Interests: Sustainable Design, As the Interrelation of Nature, Economics, Equity, and Aesthetics; Critical Evaluation Methods of Green Design; Innovations and Analysis in Passive Design

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

Paul H. Gleye, Ph.D.

UCLA, 1983

Creative/Research Interests: Place-making, Historic Preservation, City Centers

Matthew Kirkwood, BLA, MDesS, PLA and AZA

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

Steve C. Martens, M.Arch. II

University of Minnesota, 1988

Creative/Research Interests: Architectural Problem-Solving, Design Methods, Historic Preservation, Building Materials

Kathleen Pepple, MFA, MCRP

University of North Dakota, 1981;
North Dakota State University, 1991

Creative/Research Interests: Applied research in urban agriculture, its economic influence as a local food source, and its importance as a focal point for community participation; In exploration of the possibilities of functional art within this framework, her north Fargo urban art fence expands the utility of boundaries and perimeters necessary in the context of municipal gardens and farms.

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

Regin Schwaen, M.A.A.

City Building , Arkitektskolen i Aarhus, 1992

Creative/Research Interests: Urban Buildings, Conceptual Models, Minimal Concrete Structures, Visual Communication

Cindy Urness, M.Arch.

Pratt Institute, 1988

Creative/Research Interests: Building Technology, Urban Design, Utopian Cities, Sustainable Design, Universal Design

Joan Vorderbruggen, M.Arch.

University of Oregon, 2009

Creative/Research Interests: Human / Nature connections, healthy & healing environments, sustainable and low impact design

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

Advanced Athletic Training

Program and Application Information

Interim Department Head:	Dr. Margaret Fitzgerald
Program Coordinator:	Dr. Kara Gange
Department Location:	Bentson Bunker Fieldhouse
Department Phone:	(701) 231-5777
Department Web Site:	www.ndsu.edu/hnes/advanced_athletic_training_post_profession/
Application Deadline:	Rolling applications process starting December 1 starting fall
Degrees Offered:	M.S.
English Proficiency Requirements:	TOEFL iBT 81; IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) in Advanced Athletic Training and a Master of Athletic Training (MATrg) degree. The HNES department also offers a Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Dietetics (on line).

The Master of Science in Advanced Athletic Training is a post-professional degree consisting of 40 credits. The mission of post-professional graduate athletic training education is to expand the depth and breadth of applied and experiential knowledge and skills of the entry-level athletic trainer, to expand the athletic training body of knowledge, and to disseminate new knowledge in the discipline. At NDSU, the MS in Advanced Athletic Training program prepares the student with the increased depth and breadth in the following areas: Diagnostic Ultrasound, Therapeutic Modalities, Orthopedic Appliances, Emergency Care Techniques, Kinesio Tape® and Manual Therapies. The combination of research and clinical practice is emphasized in preparing the post-professional student for future employment.

Admission Requirements

1. Minimum overall GPA of 3.0 on a 4.0 scale.
2. Acceptance into the NDSU Graduate School www.ndsu.edu/gradschool.
3. Must be a BOC AT or eligible for the BOC exam and have graduated from a CAATE accredited professional (entry-level) graduate or undergraduate athletic training program.

4. Skype or interview with Athletic Training Faculty.

Admission Acceptance/Denial into the MS:

The MS application process is a very competitive process. The Application Committee reviews the graduate school and program application and determines if a student is granted an interview. The committee will set up a time with the student to complete the interview process. Criterion that is evaluated includes: overall GPA, certification status, quality of writing sample, quality of career goal statement, interview, and letters of reference.

Exceptions to the requirements can be made upon recommendations from the Application Committee. Acceptance is *not* guaranteed simply upon satisfactory completion of the requirements. Once the Athletic Training Application Committee agrees to accept the student, the program director notifies the HNES Graduate Administrative Assistant, who notifies the NDSU Graduate School. Students are notified by the NDSU Graduate School of acceptance in the program. This letter should be received approximately 2 weeks after the Graduate School receives notification.

The Master of Science in Advanced Athletic Training requires 40 semester credits (thesis option only).

Required Courses

HDFS 705 or STAT 725 or EDUC 702	Quantitative Methods in Developmental Science Applied Statistics Statistics In Educational Research
HNES 710	Introduction to Research Design and Methods in HNES
HNES 723	Advanced Techniques in Sports Medicine
HNES 765	Orthopedic Appliances
HNES 777	Scholarly Writing and Presenting in HNES
HNES 786	Diagnostic Evaluation of Athletic Injuries
HNES 789	Athletic Training Clinical Education IV
HNES 790	Graduate Seminar (Advanced Emergency Care)
HNES 790	Graduate Seminar (SPSS)
HNES 790	Graduate Seminar (Teaching)
HNES 794	Practicum/Internship (one credit per semester)
HNES 798	Master's Thesis (6 credits)
Electives: Additional 6 credits (must be 600/700 level)	
Total credits	
	40

First Year

Fall	Credits Spring	Credits Summer	Credits
HNES 710	3 HNES 723	3 HDFS 705, STAT 725, or EDUC 702	3
HNES 787	3 HNES 777	3	
HNES 794 (Semester I)	1 HNES 786	3	
	HNES 790 (Advanced Emergency Care)	1	
	HNES 794 (Semester II)	1	
	7	11	3

Second Year

Fall	Credits Spring	Credits
HNES 790 (SPSS)	1 HNES 765	3
HNES 794 (Semester III)	1 HNES 790 (Teaching)	1
HNES 798	3 HNES 794 (Semester IV)	1
Elective 600/700 Course	3 HNES 798	3
	Elective 600/700 level course	3
	8	11

Total Credits: 40

Shannon David, Ph.D., ATC

Ohio University, 2013

Research Interests: Quantification of Intervention Outcomes, Patient-Clinician Relationship

Kara Gange, Ph.D., ATC

North Dakota State University, 2010

Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German Knodel, Ph.D., ATC

North Dakota State University, 2008

Research Interests: Critical Thinking, Clinical Practice

Katie Lyman, Ph.D., ATC

University of South Florida, 2014

Research Interests: Kinesio Tape[®], Manual Medicine, and Emergency Medicine

Biochemistry

Program and Application Information

Department Chair:

Dr. Greg Cook

Department Location:

Ladd Hall

Department Phone:

(701) 231-8694

Department Web Site:

www.ndsu.edu/chemistry/

Application Deadline:

March 1 for fall, September 1 for spring. Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.

Degrees Offered:

Ph.D., M.S.

Test Requirement:

GRE (general required; subject recommended)

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.

Admission Requirements

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.

Applications will be considered at any time. Application materials should be submitted directly to the Graduate School and need to be received before May 1 to be considered for the upcoming academic year.

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.

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 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.

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 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.

Biochemistry Faculty

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

Erika Offerdahl, Ph.D.

University of Arizona, 2008

Research Interests: Biochemistry/STEM Education

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

Chemistry Faculty

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

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

Jayaraman Sivaguru, Ph.D.

Tulane University, 2003
 Postdoctoral, Columbia University, 2003-2006
 Research Area: Photochemistry, Photocatalysis (Organic and Supramolecular), Asymmetric Lighted Induced Synthesis, Molecular Recognition, Supramolecular Photochemistry, Photo-Degradation of Bio-Based Polymers

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

Biology

Program and Application Information

Department Head:	Dr. Wendy Reed
Graduate Coordinator:	Dr. Jenni Momsen
Department Location:	218 Stevens Hall
Department Phone:	(701) 231-7087
Department Email:	ndsu.biological.sciences@ndsu.edu
Department Web Site:	http://www.ndsu.edu/biology/
Application Deadline:	Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
Degrees 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 advisor. For e-mail addresses for faculty members and for 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, Botany, Environmental and Conservation Sciences, Natural Resources Management, and Zoology.

Doctor of Philosophy degrees are available in Botany, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, Natural Resources Management, and Zoology. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, 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, systematics, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Admission Requirements

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 <http://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 of State Board of Higher Education Scholarships and other 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.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research and teaching. 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.

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.

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.

Julia H. Bowsher, Ph.D.

Duke University, 2007

Research Interests: Evolutionary and Developmental Biology of Insects

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

Mark E. Clark, Ph.D.

University of Tennessee, 1996

Research Interests: Fish and Wildlife Ecology, Population Biology, Ecological Modeling, Quantitative Ecology

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

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

Donna L. Jacob, Ph.D.

University College Dublin, 2003

Research Interests: Wetland Science, Biogeochemistry

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

Keith Murphy, Ph.D.

Louisiana State University, 1989

Research Interests: Hereditary Diseases of the Domestic Dog

Erika Offerdahl, Ph.D.

University of Arizona, 2008

Research Interests: Biochemistry and Biology Education Research

Marinus L. Otte, Ph.D.

Vrije Universiteit, 1991

Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Wendy L. Reed, Ph.D.

Iowa State University, 2000

Research Interests: Physiological Ecology, Evolution of Life Histories, Maternal Effects

Katie M. Reindl, Ph.D.

North Dakota State University, 2006

Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

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

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

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

Laura Aldrich-Wolfe, Ph.D.

Cornell University, 2006

Michael J. Anteau, Ph.D.

Louisiana State University, 2006

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

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

Botany

Program and Application Information

Department Head:

Dr. Wendy Reed

Graduate Coordinator:

Dr. Jenni Momsen

Department Location:

218 Stevens Hall

Department Phone:	(701) 231-7087
Department Email:	ndsu.biological.sciences@ndsu.edu
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Doctor of Philosophy degrees are available in Botany, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, Natural Resources Management, and Zoology. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, 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, systematics, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Admission Requirements

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 advisor. 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 <http://www.ndsu.edu/biology/>.

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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.

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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.

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.

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Julia H. Bowsher, Ph.D.

Duke University, 2007

Research Interests: Evolutionary and Developmental Biology of Insects

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University of Tennessee, 1996

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Arizona State University, 2004

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Timothy J. Greives, Ph.D.

Indiana University, 2009

Research Interests: Hormones and Behavior, Seasonality, Biological Rhythms, Reproductive Eco-physiology

Britt Heidinger, Ph.D.

Indiana University, 2007

Research Interests: Physiological Ecology, Senescence, Stress Physiology

Angela Hodgson, Ph.D.

University of Minnesota, 2010

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Donna L. Jacob, Ph.D.

University College Dublin, 2003

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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

Keith Murphy, Ph.D.

Louisiana State University, 1989

Research Interests: Hereditary Diseases of the Domestic Dog

Erika Offerdahl, Ph.D.

University of Arizona, 2008

Research Interests: Biochemistry and Biology Education Research

Marinus L. Otte, Ph.D.

Vrije Universiteit, 1991

Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Wendy L. Reed, Ph.D.

Iowa State University, 2000

Research Interests: Physiological Ecology, Evolution of Life Histories, Maternal Effects

Katie M. Reindl, Ph.D.

North Dakota State University, 2006

Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

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

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

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

Laura Aldrich-Wolfe, Ph.D.

Cornell University, 2006

Michael J. Anteau, Ph.D.

Louisiana State University, 2006

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

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

Business Administration

Program and Application Information

Graduate Coordinator:

Barb Geeslin

Email:

Barb.Geeslin@ndsu.edu

Department Location:

Barry Hall

Department Phone:

(701) 231-8805

Department Web Site:

<https://www.ndsu.edu/business/programs/graduate/mba/>

Application Deadline:

International applications are due May 1 for fall semester and August 1 for spring semester. Domestic applicants should apply at least six weeks prior to the start of classes.

Degrees Offered:

Master of Business Administration (MBA)

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 electives to give the student the opportunity to pursue a particular area of interest in business or a related discipline. Concentrations in the health care industry, and in supply chain and logistics are offered.

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 aspiring 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 graduate assistantships and scholarships. Applicants must be admitted on a conditional or full-standing basis. Assistantships include a stipend and tuition waiver accompanying 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, high potential as measured by the GMAT score, and the financial needs of the student. Applications are available at www.ndsu.edu/business.

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 3-credit core courses:

ACCT 720	Strategic Cost Management	3
FIN 740	Advanced Financial Management	3
MGMT 750	Advanced Organizational Behavior	3
MGMT 751	Advanced Operations Management	3
MRKT 760	Strategic Marketing Management	3
MIS 770	Information Resources Management	3
BUSN 780	Economics for Managers in the Global Economy	3
BUSN 789	Advanced Strategic Management	3
Students will take at least an additional six semester hours of approved elective courses.		6
Total Credits		30

Health Care Industry Concentration

Core Courses		24
MPH 704	Leading and Managing Public Health Systems	3
Two of the following courses:		6
MPH 710	Healthcare Delivery in the United States	
MPH 720	Environmental Health	
MPH 741	Social and Behavioral Sciences in Public Health	
MPH 765	Cultural Competence Health Care	
Total Credits		33

Supply Chain Logistics Concentration

Core Courses		24
Additional nine credits selected from the following set of courses:		9
TL 711	Logistics Systems	
TL 715	Enterprise Resource Planning	
TL 721	International Logistics Management	
TL 723	Advanced Supply-Chain Planning Across the Enterprise	
TL 725	Technology Advances and Logistics	
TL 729	Adaptive Planning in Logistics Systems	
TL 731	Logistics Decision Analysis	
Total Credits		33

Joint MBA-Pharm.D. Degree Program

The College of Business and the College of Health Professions offer a dual degree program where students receive a Pharm.D. degree and an MBA. Pharm.D. students meet the business foundation course requirement through the pharmacy curriculum, and the choice of MBA elective courses is flexible for students in the dual degree program. To be eligible for this joint degree program, students must apply to and be accepted into both the Pharm.D. and the MBA programs. The MBA course work can be completed in one year following completion of the Pharm.D. degree.

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

John Bitzan, Ph.D.

University of Wisconsin-Milwaukee, 1997
Field: Economics

William "Bud" Bowlin, Ph.D.

University of Texas at Austin, 1984

Field: Accounting

James W. Clifton, M.Acc.

University of North Dakota, 1988

Field: Accounting

Thomas D. Dowdell, Ph.D.

Temple University, 2004

Field: Accounting

Karen Froelich, Ph.D.

University of Minnesota, 1994

Field: Strategic Management

Rajani Ganesh-Pillai, Ph.D.

University of Central Florida, 2009

Field: Marketing

David Herda, Ph.D.

University of Texas at Arlington, 2010

Field: Accounting

Yongtao "David" Hong, Ph.D.

Drexel University, 2008

Field: Accounting

Fariz Huseynov, Ph.D.

University of Memphis, 2009

Field: Finance

Ronald D. Johnson, D.B.A.

Indiana University, 1970

Field: Organizational Behavior

Joseph M. Jones, Ph.D.

University of Missouri-Columbia, 1991

Field: Marketing

Bonnie Klamm, Ph.D., CPA

Virginia Commonwealth University-Richmond, 1999

Field: Accounting Information System

Sukumarakurup Krishnakumar, Ph.D.

Virginia Polytechnic Institute, 2008

Field: Organizational Behavior

Michael Krush, Ph.D.

University of Nebraska – Lincoln, 2009

Field: Marketing

Derek Lehmborg, Ph.D.

University of Western Ontario, 2010

Field: Strategic Management

Jin Li, Ph.D.

University of Alberta, 2007

Field: Marketing

Gerry Macintosh, Ph.D.

University of Nebraska-Lincoln, 1992

Field: Sales and Sales Management

Joshua Marineau, Ph.D.

University of Kentucky, Lexington, 2012

Field: Organizational Behavior

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

Herbert Snyder, Ph.D.

Syracuse University, 1994
Field: Auditing, Forensic Accounting

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

Rodney D. Traub, Ph.D.

Purdue University, 1994
Field: Operations Management

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

C. Frederick Eisele, Ph.D.

University of Iowa, 1971
Field: Labor Management and Negotiation

Terry W. Knoepfle, J.D., CPA

University of North Dakota, 1981
Field: Business Law and Tax Accounting

Cellular and Molecular Biology

Program and Application Information

Department Phone:	(701) 231-6456
Department Email:	madonna.fitzgerald@ndsu.edu
Department Web Site:	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.
Degrees Offered:	Ph.D.
Test Requirement:	GRE
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

The CMB Program offers interdisciplinary research education and training opportunities that lead to a Ph.D. In this setting, students learn to integrate across concepts and to use multiple approaches to study contemporary biological problems. Students have access to state-of-the-art facilities and equipment in faculty laboratories and core facilities around campus. 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.

The CMB degree requirements include a series of required CMB core courses; additional elective courses; written and oral preliminary examinations; a doctoral dissertation based on independent, original research in the area of cellular and molecular biology under the direction of a CMB faculty member; and an oral defense of the dissertation.

CMB faculty members are recognized and respected nationally and internationally for contributions to their fields of study. They are drawn from 10 academic departments, including Animal Sciences, Chemistry and Molecular Biology, Biological Sciences, Cereal and Food Sciences, Entomology, Health, Nutrition, and Exercise Sciences, Pharmaceutical Sciences, Plant Pathology, Plant Sciences, and Veterinary and Microbiological Sciences. With the interdisciplinary nature of the program, you can look forward to working closely with not just one but many faculty members at NDSU.

Students may engage in basic and applied aspects of cellular and molecular biology research in various systems, including animals, plants, and microorganisms. Examples of current research by CMB faculty include the following:

- Adaptation to environmental stress
- Assistive reproductive technology
- Apoptosis
- Cancer
- Cell-cell communication
- Cell cycle regulation
- Cell metabolism
- Cytogenetics
- Drug action and metabolism
- Enzymology and metabolic regulation
- Extracellular matrix
- Gene regulation and expression
- Hormone biosynthesis, metabolism, and evolution
- Immunology
- Molecular pathogenesis
- Protein structure and function
- Signal transduction
- Stem cells and developmental processes

Admissions Requirements

The Cellular and Molecular Biology Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. If possible, applicants should identify at least one cellular and molecular biology faculty member with whom they wish to study.

The following undergraduate courses have been identified as 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.

In addition, introductory courses in computer science, statistics, and technical writing are recommended. Deficiencies in required courses may be made up within the first year of resident study without graduate credit.

Financial Assistance

Financial support, if required, is usually provided by the department in which the student will carry out research. In reviewing each application, the Steering Committee will contact the faculty member(s) identified by the applicant to determine if financial support is available. Students seeking financial support also can contact either the CMB faculty member(s) with whom they wish to study or the chair of the CMB Steering Committee.

Program Administration

This interdisciplinary graduate program is administered by the CMB Steering Committee. The committee is composed of five CMB faculty members representing five different academic departments. Steering Committee members, who serve overlapping three-year terms, are elected at a yearly meeting of the CMB faculty.

The duties of the Steering Committee include:

1. review of each CMB student's plan of study, proposed research topic, and general progress;
2. review of applications for membership in the CMB faculty; and
3. implementation of the CMB program by established procedures.

By the end of the first academic year, the student will select an academic adviser from among the CMB 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 CMB faculty member, and an appointee of the Graduate School. One committee member must be from outside the student's academic 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. The plan shall be approved by the student's Graduate Advisory Committee, the CMB Program Director, the department chair, the academic dean, and the Graduate School dean. The Plan of Study must be filed in the Graduate School prior to scheduling the comprehensive written examination.

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 CMB program requires students to complete a series of 7 courses totaling 21-23 semester credits in 4 core areas. 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.

Courses Offered

Biochemistry and Molecular Biology

BIOC 701	Comprehensive Biochemistry I (required)	4
BIOC 702	Comprehensive Biochemistry II (required)	4
BIOC 673	Methods of Biochemical Research (required)	3

Cellular Biology

ZOO 820	Advanced Cell Biology	3
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Molecular Biology

BIOC 674	Methods of Recombinant DNA Technology (required)	3
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Select one of the following:

BIOC 719	Molecular Biology of Gene Expression and Regulation	
MICR 783	Advanced Bacterial Genetics and Phage	
PLSC 731	Plant Molecular Genetics	

Technique Courses

Select one of the following:

MICR 645	Animal Cell Culture Techniques	
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The core courses will normally be completed by the end of the second year in residence. These courses must be completed before the student takes the preliminary written examinations, whereas the elective courses may be taken at any time during the program prior to defense of the dissertation. The elective courses will normally be classes offered by the department in which the student is doing research or other departments participating in the CMB program. Each student is expected to attend all CMB seminars and present at least one seminar per year throughout the program.

Examination

Written Preliminary Examination covers the first three core areas (biochemistry and molecular biology, cellular biology, and molecular biology) and is normally taken at the end of the second year in residence. The written preliminary examination must be passed before the comprehensive oral examination can be scheduled.

Comprehensive Oral Examination shall be taken no later than the end of the third year in residence. This examination will be based on a non-dissertation research topic that will be submitted in the format of a National Institutes of Health or National Science Foundation postdoctoral fellowship research proposal. After successful completion of the comprehensive oral examination, the student will be formally admitted to candidacy for the Doctor of Philosophy degree. At least one academic semester, and preferably two semesters, shall elapse between the preliminary oral examination and the oral defense of the research-based dissertation.

Dissertation Research

A short proposal describing research suitable for preparation of a dissertation in Cellular and Molecular Biology shall be prepared and submitted to the student's Graduate Advisory Committee and the CMB Steering Committee for review and approval. The dissertation must show originality and demonstrate the student's capacity for independent research. It must embody results of research that constitutes a definitive contribution to knowledge.

In addition to the defense of the dissertation in the final oral examination, the candidate will present a final public seminar based on the dissertation research.

Teresa Bergholz, Ph.D.

Michigan State University, 2007

Field: Functional Genomics of Foodborne Pathogens

Department: Chemistry and Biochemistry

Eugene S. Berry, Ph.D.

Northeastern University, 1983

Field: Animal Virology (ss(+) RNA Viruses), Genetic Variation, Mechanisms of Pathogenesis and Virulence

Department: Veterinary and Microbiological Sciences

Julia Bowsher, Ph.D.

Duke University, 2007

Field: Evolutionary Developmental Biology; Molecular Basis of Pattern Formation

Department: Biological Sciences

Chris Colbert, Ph.D.

Purdue University, 2000

Field: Structure Biology with a Focus on the Biochemistry of Proteins Involved in Iron Import and Utilization

Department: Chemistry and Biochemistry

Glenn Dorsam, Ph.D.

Virginia Commonwealth University, 1998

Field: Epigenetic Regulation

Department: Chemistry and Biochemistry

Nathan Fisher, Ph.D.

University of Michigan, 2006

Field: Ecology and Evolution of Non-Commensal Bacterial Pathogens

Department: Veterinary and Microbiological Sciences

Anna T. Grazul-Bilska, Ph.D.

University of Agriculture and Technology, 1983

Field: Animal Embryology and Reproductive Physiology & Endocrinology, Assisted Reproduction Technology

Department: Animal and Range Sciences

Kendra Greenlee, Ph.D.

Arizona State University, 2004

Field: Developmental Physiology and Immunology
Department: Biological Sciences

Tim Greives, Ph.D.

Indiana University, 2009
Field: Endocrine Regulation of Seasonality, Reproductive Neuroendocrinology, Hormones and Behavior
Department: Biological Sciences

Bin Guo, Ph.D.

State University of New York at Buffalo, 1999
Field: Cancer Cell Biology, Apoptosis, Molecular Pharmacology
Department: Pharmaceutical Sciences

Lauren Hanna, Ph.D.

Texas A&M University, 2013
Field: Quantitative Genetics, Animal Breeding, Whole System Approaches to Genomic Associations of Quantitative Traits
Department: Animal Sciences

Stuart Haring, Ph.D.

University of Iowa, 2004
Field: DNA Metabolism and Cell Cycle Regulation
Department: Chemistry and Biochemistry

Britt Heidinger, Ph.D.

Indiana University, 2007
Field: Physiological Ecology
Department: Biological Sciences

Yagna Jarajapu, Ph.D.

Glasgow Caledonian University, 2002
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
Department: Pharmaceutical Sciences

Estelle Leclerc, Ph.D.

University of Paris XI, 1994
Field: Melanoma, Pancreatic Cancer; Monoclonal Antibodies as Diagnostic and Therapeutic Agents; Mechanism of RAGE Signaling
Department: Pharmaceutical Sciences

Phillip E. McClean, Ph.D.

Colorado State University, 1982
Field: Plant Molecular Genetics
Department: Plant Sciences

Stephen O'Rourke, Ph.D.

University of Wisconsin, 1995
Field: Vascular Pharmacology/physiology, Regulation of Vasomotor Tone, Smooth Muscle-Endothelial Cell Interactions
Department: Pharmaceutical Sciences

Birgit Pruess, Ph.D.

Ruhr-Universität Bochum, 1991
Field: Bacterial Physiology and Global Gene Expression
Department: Veterinary and Microbiological Sciences

Steven Qian, Ph.D.

University of Iowa, 1999
Field: Free Radical Metabolism
Department: Pharmaceutical Sciences

Sheela Ramamoorthy, Ph.D.

Virginia Tech, 2006
Field: Virology, Immunology, and Vaccinology
Department: Veterinary and Microbiological Sciences

Dale A. Redmer, Ph.D.

University of Missouri - Columbia, 1983

Field: Animal Physiology, Reproductive Physiology, Fetal Growth, Placental Function, Ovarian Function, Vascular Growth

Department: Animal Sciences

Katie Reindl, Ph.D.

North Dakota State University, 2006

Field: Cancer Cell Biology, Cell Migration and Metastasis, Cell Cycle Control, Extracellular Matrix Interactions

Department: Biological Sciences

Lawrence P. Reynolds, Ph.D.

Iowa State University, 1983

Field: Factors Influencing Fetal and Placental Growth and Development in Compromised Pregnancies

Department: Animal Sciences & Center for Nutrition and Pregnancy

Kenton Rodgers, Ph.D.

University of Iowa, 1988

Field: Inorganic and Bioinorganic Chemistry

Department: Chemistry and Biochemistry

Jane Schuh, Ph.D.

North Dakota State University, 2002

Field: Immunology of Chronic Airway Remodeling, Cellular Differentiation in Pulmonary Disease, Animal Modeling of Allergic Airway Disease (Asthma)

Department: Veterinary and Microbiological Sciences

Sangita Sinha, Ph.D.

Purdue University, 2000

Field: Structure Biology and Biochemistry of host pathogen interactions

Department: Chemistry and Biochemistry

Chengwen Sun, Ph.D.

Jilin University, China, 2000

Field: Blood Pressure Regulation; Cell Signaling

Department: Pharmaceutical Sciences

Kendall Swanson, Ph.D.

University of Kentucky, 2000

Field: Ruminant Nutrition, Energy Metabolism, Protein Metabolism, Pancreatic Function, Beef Cattle Production

Department: Animal Sciences

Stefan Vetter, Ph.D.

Swiss Federal Institute of Technology, 1998

Field: Development of Small Molecules and Peptides for the Modulation of Receptor for Advanced Glycation Endproducts (RAGE) in Disease States

Department: Pharmaceutical Sciences

John Wilkinson, Ph.D.

Vanderbilt University, 2001

Field: Cancer Cell Metabolism, Cell Death Pathways, Mitochondrial Gene Expression, Animal Models of Tumorigenesis

Department: Chemistry and Biochemistry

Erxi Wu, Ph.D.

Sheffield University, UK, 1998

Field: Pharmacogenomics; Tumor Therapeutic Targets; Drug Discovery; Anticancer Natural Products

Department: Pharmaceutical Sciences

Cereal Science

Program and Application Information

Department Chair:

Dr. Richard Horsley

Program Coordinator:

Dr. Frank Manthey

Department Location:

Plant Sciences, Loftsgard Hall

Department Phone:

(701) 231-7971

Department Web Site:

www.ag.ndsu.edu/cerealscience/

Application Deadline:	International applications are due May 1st for fall and August 1 for spring. Domestic applicants should apply at least one month.
Degrees 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. Faculty members participating in the Cereal Science graduate program reside in Departments of Agricultural and Biosystems Engineering, Plant Sciences and Veterinary and Microbiological Sciences. Academic policies are under the governance of the Cereal Science graduate program faculty.

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.

Admission Requirements

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.

Research Facilities and Equipment

Faculty in the Cereal Science graduate program maintains specialized equipment that evaluates cereal and food quality, including laboratory equipment such as spectrophotometers, 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.

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.

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 670	Food Processing II	
CFS 671	Food Processing Laboratory	
CFS 758	Fundamentals of Flour Testing and Bakng	
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 664	Food Analysis	
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 Food Microbiology	

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 35 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.

CFS 650	Cereal Technology (Students that have previously taken CFS 650 can opt to take additional CFS 799 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
PLSC 794	Practicum	2
PLSC 899	Doctoral Dissertation	1-15
Statistics (one of the following courses)		3
PLSC 724	Field Design I	
STAT 662	Introduction to Experimental Design	
STAT 725	Applied Statistics	
Technology Group		9
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 664	Food Analysis	

CFS 674	Sensory Science of Foods
MICR 752	Advanced Food Microbiology
CFS 764	Carbohydrate Chemistry
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 CHEM 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.

Degree Requirements for Accelerated Masters of Science Program:

Student must meet all requirements of the Food Science B.S. and Cereal Science M.S. programs to be awarded these degrees. The Graduate School has the following minimum requirements:

- Minimum of 30 credits total (6-10 of which are thesis research credits CFS 798).
- Minimum of 16 course credits in 601-689 and/or 700-789 level (please see the Graduate School Bulletin for more details)

Clifford A. Hall III, Ph.D.

University of Nebraska-Lincoln, 1996

Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing On Food Safety Issues

Frank Manthey, Ph.D.

North Dakota State University, 1985

Research Interests: Durum Wheat Quality and Pasta/Noodle Processing

Deland Myers, Ph.D.

Iowa State University, 1984

Research Interests: Utilization of Legume and Cereal Proteins in Nonfood and Food Applications and Their Functionality

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

Dennis P. Wiesenborn, Ph.D.

Rice University, 1988

Research Interests: Food Engineering, Process Development, Oilseeds Processing

Charlene Wolf-Hall, Ph.D.

University of Nebraska-Lincoln, 1995

Research Interests: Food Microbiology and Food Safety

Associate Faculty

Jae Ohm, Ph.D.

Kansas State University, 1996

Research Interests: Cereal Chemistry

Chemistry

Program and Application Information**Department Chair:**

Dr. Greg Cook

Department Location:

Ladd Hall

Department Phone:

(701) 231-8694

Department Web Site:www.ndsu.edu/chemistry/**Application Deadline:**

March 1 for fall, September 1 for spring Spring admissions are given occasionally depending on fellowship availability and faculty interests. If there are no spring openings, spring applications are automatically considered for the subsequent fall semester.

Degrees Offered:

Ph.D., M.S.

Test Requirement:

GRE (general required; subject recommended)

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.

Admission Requirements

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.

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 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.

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.

Chemistry Faculty

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

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

Jayaraman Sivaguru, Ph.D.

Tulane University, 2003

Postdoctoral, Columbia University, 2003-2006

Research Area: Photochemistry, Photocatalysis (Organic and Supramolecular), Asymmetric Lighted Induced Synthesis, Molecular Recognition, Supramolecular Photochemistry, Photo-Degradation of Bio-Based Polymers

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

Biochemistry Faculty

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

Erika Offerdahl, Ph.D.

University of Arizona, 2008

Research Interests: Biochemistry/STEM Education

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

Civil Engineering

Program and Application Information

Interim Department Chair:

Dr. Dinesh Katti

Department Location:

201 Civil and Industrial Engineering Bldg.

Department Phone:

(701) 231-7244

Department Web Site:

www.ndsu.edu/ce/

Application Deadline:

February 15 for fall admission; September 15 for spring admission

Degrees Offered:

Ph.D., M.S.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

The Department of Civil 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 and Architecture 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.

Admission Requirements

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 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.

Magdy Abdelrahman, Ph.D.

University of Illinois-Urbana, 1996

Research Interests: Characterization of Modified Asphalt Binders and Mixes, Pavement, Maintenance and Rehabilitation Techniques, Performance-Related, Specifications for Pavement Materials, Quality Control and Quality, Assurance in Pavement Construction.

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

S. Gajan, Ph.D.

University of California, Davis, 2006

Research Interests: Geotechnical Engineering, Earthquake Engineering, Dynamic Soil - Structure Interaction

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

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

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

Eakalak Khan, Ph.D.

University of California, Los Angeles, 1997

Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Wei Lin, Ph.D.

SUNY at Buffalo, 1992

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

G. Padmanabhan, Ph.D.

Purdue University, 1980

Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

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.

Gary R. Smith, Ph.D.

Purdue University, 1986

Research Interests: Quality Control and Systems Applications, Decision Analysis and Modeling Techniques, Safety Performance Measurement and Improvements in Labor Productivity

Amiy Varma, Ph.D.

Purdue University, 1993

Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management

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

Frank Yazdani, Ph.D.

University of New Mexico, 1987

Research Interests: Structures, Constitutive Modeling of Materials, and Continuum Mechanics

Adjunct

Denver D. Tolliver, Ph.D.

Virginia Polytechnic University, 1989

Research Interests: Transportation, Planning and Economics

Robert Zimmerman, Ph.D.

North Dakota State University, 1991

Research Interests: Water and Wastewater Treatment, Solid Waste

Coatings and Polymeric Materials

Program and Application Information

Department Chair:	Dr. Dean Webster
Email:	Dean.Webster@ndsu.edu
Department Location:	Research I, Research Park
Department Phone:	(701) 231-7633
Department Web Site:	www.ndsu.edu/cpm/
Application Deadline:	April 15 for fall semester. Applications are reviewed for all semesters, however fall start is preferred.
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE (required for international applicants, 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 Science 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, 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.

First-year students who enter the program may take entrance examinations, which are used by the graduate committee primarily for advisory purposes. 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.

Admission Requirements

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 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.

Research Facilities and Equipment

The Department of Coatings and Polymeric Materials is housed in a new 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 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.

Gordon P. Bierwagen, Ph.D.

Iowa State University, 1968

Research Interests: Surface Chemistry of Coatings Materials, Corrosion Protection by Coatings, Electrochemical Characterization of Coatings and Polymers, Coating Lifetime Prediction, Concentrated Random Composites

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

Andriy Voronov, Ph.D.

Lviv Polytechnic National University, 1994

Research Interests: Synthesis of Polymers for Stimuli-Responsive Materials, Including Micellar Assemblies, Nanoparticles, Functional Capsules, Colloidosomes. Responsive Amphiphilic Macromolecules for Biomedical Applications, Including Drug Delivery

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

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

Dante Battocchi, Ph.D. (Center for Surface Protection, NDSU)

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

Bret Chisholm, (CNSE, NDSU)

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. (Valspar)

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 Pispersions, 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

Program and Application Information

Program Director:

Dr. Paul Kelter

Department Location:

Center for Science & Math Education, FLC 314

Department Phone:

(701) 231-6336

Degrees Offered:

Certificate (Students enrolled in the CTC program must be concurrently enrolled in a graduate program leading to a degree.)

Program Description

The Graduate Certificate Programs in College Teaching (CTC) provide a structured program in pedagogy for NDSU graduate students from across campus who plan to teach in a college or university. Students study contemporary education research focused on higher education issues, as well as gain experience in the teaching and learning process through microteaching modules, field experience, peer observations, and a structured practicum.

Admissions Requirements

To be admitted to the program, the applicant must:

1. Hold a baccalaureate degree from an educational institution of recognized standing.
2. 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. Applications should be submitted directly to the graduate school.
3. Be a current degree-seeking student in an enrolled graduate program.

Foundation Courses (Choose one)

COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	3
HDFS 802	Teaching Developmental Science	3
STEM 810	Teaching College Science	3

Electives (Choose one)

AHSS 796	Special Topics (Emerging Trends in Teaching and Learning Online)	3
EDUC 728	Instructional Technology for Teaching and Learning	3
EDUC 753	Managing/ and Monitoring Learning (*)	3
EDUC 851	Adult Learning	3
STEM 820	STEM Curriculum and Instruction	3

Required Teaching Practicum

EDUC 792	Graduate Teaching Experience (**)	3
or EDUC 892	Graduate Teaching Experience	

Electronic Teaching Portfolio

*Refers to courses cross-listed to be taken under a prefix in the student's major field.

**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 a faculty teaching mentor. Students will prepare a 2-page field experience proposal for approval from the home department chair, the STEM Track Supervisory Committee, and the CTC Director during the semester prior to the experience.

Communication

Program and Application Information

Department Chair:	Dr. Mark Meister
Graduate Coordinator:	Dr. Stephenson Beck
Department Location:	Minard Hall 338
Department Phone:	(701) 231-7705
Department Web Site:	www.ndsu.edu/communication/
Application Deadline:	Ph.D - March 1; M.S. and M.A. - no deadline
Degrees Offered:	Ph.D., M.A., M.S.
Test Requirement:	GRE (general required; subject recommended)
English Proficiency Requirements:	TOEFL iBT 100, IELTS 7 for admission; TOEFL iBT 100, IELTS 7 for teaching assistantship

Program Description

The graduate program in communication offers graduate study leading to the M.A., M.S., 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. In addition, the M.A. and M.S. degrees are available through online delivery. Information also is available on the department's Web site, www.ndsu.edu/communication.

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Science or 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; conference paper; final course paper
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) may 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 may apply for teaching assistantships at the master's or doctoral degree level. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program. The teaching assistantship deadline is March 1 for the following fall semester.

Graduate assistants receive a stipend and tuition waiver. Applications are available from the department office or online from the department's web site (<https://www.ndsu.edu/communication>). (<http://www.ndsu.edu/communication>)

Master's program

The Master of Arts program is designed for students who are interested in conducting qualitative or rhetorical research, while the Master of Science program is designed for those interested in quantitative research. Both programs require 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
Teaching assistants are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.		
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	
Students pursuing the M.A. degree must take at least one qualitative methods course (COMM 704, COMM 708, COMM 767, or SOC 700).		
Students pursuing the M.S. degree must complete at least one quantitative methods course (COMM 707, COMM 710, SOC 701, or STAT 725).		
Elective Specialization		
12-15 credits of additional coursework, depending on whether the thesis or paper/project 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 Paper/Project		
The paper/project option requires three credits of COMM 797. The thesis requires six credits of COMM 793.		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 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 Scholars courses.

Course Requirements

Minimum of 30 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 701	Advanced Research Methods in Communication I	3
COMM 711	Communication Theory	3
COMM 735 or 783	Media and Society or Org Comm Theory Course	3
Teaching assistants, without adequate prior teaching experience, are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.		
Content Concentration		
Minimum of 15 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 Courses		
Exclusive of COMM 701, maximum of 6 credit hours of independent study		6
Dissertation		

Comprehensive Exam

When coursework is nearly completed, the DGS 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

Ann Burnett, Ph.D.

University of Utah, 1986

Research Interests: Legal Communication, Small Group Communication, Interpersonal Communication, Gender and Communication

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

Robert S. Littlefield, Ph.D.

University of Minnesota, 1983

Research Interests: Intercultural Communication, Risk and Crisis Communication, Forensic History and Pedagogy

Pamela Lutgen-Sandvik, Ph.D.

Arizona State University, 2005

Research interests: workplace bullying, organizational communication

Zoltan Majdik, Ph.D.

University of Southern California, 2008

Research Interests: Science and Risk Communication in Biotechnological Practice, Rhetorical and Argumentation Theory, Ethics and Moral Theory

Mark Meister, Ph.D.

University of Nebraska, 1997

Research Interests: Rhetorical and Critical Theory, Environmental Communication

Amy O'Connor, Ph.D.

Purdue University, 2004

Research Interests: Organizational Communication, Corporate Advocacy, Public Affairs and Issues Management

Charles Okigbo, Ph.D.

Southern Illinois University, 1982

Research Interests: Social and Behavioral Change Communication, Health Communication

Carrie Anne Platt, Ph.D.

University of Southern California, 2008

Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

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

Nan Yu, Ph.D.

Pennsylvania State University, 2009

Research Interests: Health Communication, International Communication

Emeritus

Paul E. Nelson, Ph.D.

University of Minnesota

Judy C. Pearson, Ph.D.

Indiana University

Community Development

Program and Application Information

Program Coordinator:

Dr. Gary Goreham

Email:

gary.goreham@ndsu.edu

Department Location:

Minard Hall Rm. 428

Department Phone:

(701) 231-7637

Department Web Site:

www.ndsu.edu/ced/

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.

Degrees Offered:

M.A., M.S.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

The Department of Sociology, Anthropology, and Emergency Management 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.

Program Requirements

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.

The core courses are:

CED 709	Community Development Orientation	1
CED 711	Principles and Strategies of Community Change	3
CED 713	Community Development II: Organizing for Community Change	3
CED 715	Community Analysis: Introduction to Methods	3
CED 717	Community and Regional Economic Policy and Analysis	3
CED 719	Community Natural Resource Management	3

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

A sample schedule for a student in the Building Economic Capacity track may look as follows:

First Year					
Fall	Credits	Spring	Credits	Summer	Credits
Community Development Orientation	1	Community Development II	3	Community and Natural Resources Management	3
Community Development I	3	Community and Regional Economics and Analysis	3		
Community Analysis: Introduction to Methods	3				
	7		6		3
Second Year					
Fall	Credits	Spring	Credits	Summer	Credits
Economic Development and Strategies and Programs	3	Cluster and Regional Economic Development Workshop	3	Real Estate	3
Impact Analysis	3	Thesis	2	Thesis	3
Cost Benefit Analysis	3				
	9		5		6

Total Credits: 36

For additional information: http://www.ndsu.edu/ced/on_line_masters/

Computer Science

Program and Application Information

Department Head:	Dr. Brian M. Slator
Graduate Coordinator:	Dr. Changhui Yan
Department Location:	258 QBB (formerly IACC)
Department Phone:	(701) 231-8562
Department Email:	gradinfo@cs.ndsu.edu
Department Web Site:	cs.ndsu.edu/
Application Deadline:	February 1 for fall semester; September 1 for spring semester**
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE
English Proficiency Requirements:	TOEFL iBT 79; IELTS 6.5

**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. There are no summer admissions for any Computer Science program.

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. Graduate course work in Operations Research is offered and may be used to provide an operations research concentration to either program. For additional information, please contact the department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

Admissions Requirements

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.

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; PTE Academic score of at least 53.
- Eligibility for a teaching or tutoring assistantship requires the following additional requirements: TOEFL score minimum overall of 79, with minimum of 19 speaking, and minimum of 21 writing; IELTS score minimum overall of 6.5, with a minimum of 5.5 speaking and minimum of 6.0 writing; or PTE Academic score minimum overall of 53, with a minimum of 51 speaking and minimum of 56 writing.

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.

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. 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.

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.

Master of Science

Master of Science in Computer Science Degree Requirements

32

Semester core courses (required of all students):

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

Plus 3-5 additional 700-800 level Computer Science courses selected in consultation with your adviser.

Thesis Option

Additional graduate coursework	8-12
CSCI 798	Master's Thesis (6-10 credits)

Comprehensive Study Option

Additional Graduate Coursework	14-16
CSCI 797	Master's Paper (2-4 credits)

- Research adviser should be selected by the end of 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.
- 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 6 credits of independent study.
- Comprehensive Examination (on the core courses) should be completed by the end of the fourth semester.
- Final Oral Examination on the student's research.

Doctor of Philosophy

Doctor of Philosophy in Computer Science degree requirements

90

Core Courses: (or their equivalent in transfer or examination credits)

CSCI 713	Software Development Processes
CSCI 724	Survey of Artificial Intelligence
CSCI 741	Algorithm Analysis
CSCI 765	Introduction To Database Systems

Plus 5-10 additional courses selected in consultation with your adviser.

- Research adviser should be selected by the second semester at NDSU.
- A minimum of 15 didactic credits numbered 700 -789 or 800-898, of which at least 9 are not included in the Computer Science Core Courses listed above.
- 30-45 semester credit hours of research – The Ph.D. requires a research contribution to be made under the supervision of one of the Computer Science Department's graduate faculty members.
- Research proposal presentation and preliminary oral examination (qualifying exam) should be completed by the fourth semester at NDSU
- Satisfactory completion of the Comprehensive Exam at the PhD Level. (written based on the core courses)
- Dissertation
- Final oral examination on the dissertation.

Some additional information regarding the course work:

- A student holding a Master of Science degree from an educational institution of recognized standing may use:
 - 30 credits previously completed toward the 90 total credits required for the doctoral degree **OR**
 - Up to 9 credits previously earned graduate level courses with a grade of B or better may be used toward the 90 total credits for the doctoral degree.

- The 90 credits (including any credits transferred) must be computing-related with at least 45 credits involving significant graduate level computer science material. Generally, these credits would be offered by a computer science department.
- The 90 credits may include a maximum of 15 credits of non-didactic courses (independent studies or seminars). Seminars are limited to 4 of those credits.
- The student's advisory committee, the department chair, the college dean, and the graduate dean all must approve the course work on the plan of study.

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Wei Jin, Ph.D.

State University of New York at Buffalo, 2008

Research Interests: Text and Web Mining, Information Retrieval and Extraction, Machine Learning, Bioinformatics and Health Informatics

Dean Knudson, Ph.D.

Northwestern University, 1972

Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.

University of Texas, Dallas, 2005

Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.

University of British Columbia, 2008

Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.

Brunel University, 2004

Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.

Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978

Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

William Perrizo, Ph.D.

University of Minnesota, 1972

Research Interests: Data Mining, Distributed Database Systems, Centralized Database Systems, Data Security, Bioinformatics

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009

Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.

New Mexico State University, 1988

Research Interests: Artificial Intelligence, Educational Media

Vasant Ubhaya, Ph.D.

University of California-Berkeley, 1971

Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.

Mississippi State University, 2009

Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.

Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Pratap Kotala, Ph.D.

North Dakota State University, 2015

Oksana Myronovych, Ph.D.

North Dakota State University, 2015

Adjunct Faculty

Hyunsook Do, Ph.D.

University of Nebraska, 2007

Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Construction Management

Program and Application Information

Department Chair:	Dr. Yong Bai
Department Location:	AR/LA 106
Department Phone:	(701) 231-6521
Department Web Site:	www.ndsu.edu/construction/
Application Deadline:	May 1 for the fall semester, October 1 for the spring semester.
Degrees Offered:	M.S., Master of Construction Management, Certificate
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 followed by a description of each of the programs.

- Master of Science in Construction Management
- Master of Construction Management
- Graduate Certificate in Construction Management

Master of Science in Construction Management

The Master of Science in Construction Management is an on-campus, research-focused degree. 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.

Admission Requirements

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.
- The Graduate Record Examination (GRE) is required for all applicants.
- Submit a one-page "Statement of Research Objectives and Qualifications" that directly relates to one 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

Various types of financial assistance are available to graduate students as described on the Graduate School website. 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

The Master of Construction Management is an online professional program consisting of 30 credits of course work and the Associate Constructor (AC) Exam. The Master of Construction Management is administered through Distance and Continuing Education (DCE) at NDSU.

Admission Requirements

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.
- 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

Graduate assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU are not available to students in the Master of Construction Management program.

Graduate Certificate in Construction Management

The Program of Graduate Certificate in Construction Management provides an online course learning experience constituting a distinct knowledge-base and a specific set of associated skills within the areas of estimating, scheduling, and project management at the graduate level. These three areas constitute a body of knowledge that represents the fundamental core of construction management.

Admission Requirements

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 3.0 or equivalent to attain full standing.
- 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 assistantships, tuition waivers, and financial aid offered by the CM&E Department, the Graduate School, or NDSU are not available to students in the Graduate Certificate in Construction Management Program.

Master of Science in Construction Management

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:

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

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.

Required Courses

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 (ACEExam)	
Total Credits		30

Schedule of Courses

Summer 2015

CM&E 725	Decision Making and Risk Analysis
CM&E 740	Financial and Economic Concepts for Construction Managers

Fall 2015

CM&E 603	Scheduling and Project Control
CM&E 701	Construction Technology and Equipment
CM&E 712	Construction Management

Spring 2016

CM&E 605	Construction Support Operations
CM&E 711	Construction Cost Estimating
CM&E 715	Construction Specifications and Contracts

Summer 2016

CM&E 660	Infrastructure Management
CM&E 703	Advanced Project Planning and Control

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 March 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

The Graduate Certificate in Construction Management is administered through Distance and Continuing Education (DCE) at NDSU. The certificate program consists of nine credits encompassing the following three (3) courses:

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.

University of Alberta, 2002

Research Interests: Infrastructure and Assets Management, Construction Materials, Engineering Education, Computational Modeling

Yong Bai, Ph.D., P.E., F.A.S.C.E.

Chair and Professor

North Carolina State University, 1996

Research Areas: Infrastructure Construction and Maintenance, Highway Work Zone Safety, International Construction Management, and Emerging Technologies in Construction

Bradley Bowen, Ed.D.

North Carolina State University, 2011

Research Interests: Engineering Education, K-12 Engineering, Project-based Learning

Zhili (Jerry) Gao, Ph.D.

Iowa State University, 2004

Research Interests: 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.

Iowa State University, 2008

Research Areas: Cost Control, Sustainability, and Engineering Education

Jongchul Song, Ph.D.

The University of Texas at Austin, 2005

Research Interests: Energy Efficient Building Technology (Thermal Insulation Performance), Asphalt Pavement Construction (Temperature-Density Relation)

Matthew L. Stone, Ph.D.

University of Alabama, 2013

Research Areas: Cost Estimating, Life Cycle Analysis, and Infrastructure Construction

Huojun Yang, Ph.D.

University of Nebraska-Lincoln, 2012

Research Interest: Built Environmental Systems and Building Energy

Counseling (Counselor Education)

Program and Application Information

Department Head:

Dr. William Martin

Graduate Coordinator:

Dr. Brenda Hall

Department Location:

SGC Building, 1919 N. University Drive

Department Phone:

(701) 231-7202

Department Web Site:

www.ndsu.edu/education/counselor_education/

Application Deadline:

February 1 for summer start

Degrees Offered:

M.Ed., M.S.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

The Counselor Educational program, accredited by the Council for Accreditation of Counseling and Related Programs (CACREP), within the School of Education prepares counselors to work professionally with persons from diverse cultural backgrounds and in a variety of settings. Program specializations are available in school counseling and in clinical mental health counseling at the master's degree level.

Review of application for master's degree programs is once each year beginning after the application deadline of February 1. Students who are accepted into the school counseling degree program are required to start classes the following summer; Students who are accepted into the clinical mental health degree program have the option to begin classes in the following summer or the following fall.

Admissions 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 M.Ed. and the M.S. programs require an essay discussing professional philosophy and professional goals, as well as an entrance interview.

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. The School of Education reserves the right to obtain additional information about the student'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.

A student must meet all requirements for full admission. A cumulative baccalaureate GPA of 3.0 or better on a 4.0 scale serves as a guideline for full acceptance. After being accepted for graduate study in the School of Education, the student should contact an adviser assigned to her/him for assistance in filing a plan of study for consideration by the School of Education.

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.

Degree Requirements

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.

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.

Carol E. Buchholz Holland, Ph.D.

Kansas State University, 2005

Research Interests: School Counseling; Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D.

Virginia Polytechnic Institute and State University, 1993

Research Interests: Intimate Partner Violence, Community/School partnerships, Collaborative Group Practices Studies, and Substance Abuse Counseling

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, 2005

Research Interests: Community Counseling, Counselor Education Counselor Supervision, Brief and Solution-Focused Approaches

Jodi L. Tangen, Ph.D.

The University of North Carolina at Greensboro, 2015

Research Interests: Clinical Supervision, Counselor Education, Relational Depth, Spirituality

Counselor Education and Supervision

Program and Application Information

Department Head:	Dr. William Martin
Graduate Coordinator:	Dr. Jill Nelson
Department Location:	SGC Building, 1919 N. University Drive
Department Phone:	(701) 231-7202
Application Deadline:	October 1 for spring; May 1 for fall.
Degrees Offered:	Ph.D.

Program Description

The Counselor Education Program offers graduate study leading to the Master of Education (M.Ed.), Master of Science (M.S.), and Doctor of Philosophy (Ph.D.) degrees. The doctorate is in Counselor Education and Supervision.

The doctoral program (Ph.D.) in Counselor Education and Supervision upholds the highest national standards as demonstrated by accreditation from the Council for Accreditation of Counseling and Related educational Programs (CACREP). The program is accredited until October 30, 2020. Graduates of our program are trained to be leaders in recognizing and respecting the needs of individuals and groups and demonstrate an increased awareness of multicultural and diversity issues. The culture of the doctoral program is one of individual attention and support from faculty so that students are able to develop a plan of study that best suits their individual needs and professional interests. There are a small number of students admitted each year so that faculty may build strong relationships with their advisees, as well as students in their classes. The counselor education faculty members mentor students in research and scholarship.

Admissions Requirements

We consider applications for the fall and spring semesters. Deadlines are October 1 for spring and May 1 for fall. To be considered for acceptance, the applicant will be evaluated individually based upon but not limited to the following:

- Meet graduate school admissions requirements, including a Bachelor's Degree with a minimum grade average of 3.0;
- Possess a Master's degree in counseling or a related field. Graduates of CACREP accredited programs receive preference. If individuals do not have a master's degree, they may be considered, but must meet all CACREP requirements for a master's degree prior to taking core courses in counseling;
- Demonstrate an interest in counseling, teaching, research, and professional service;
- Express counselor education and supervision career goals;
- Arrange for in-depth interview with the Counselor Education faculty at a date and time specified by the faculty;
- Meet the two-year cohort residency requirements and attend the program full time for those two years;
- Complete all international student requirements, where appropriate;
- Discuss, as appropriate, relevant personal history within the interview process;
- Sign a disclosure statement regarding activities, which may be deemed inappropriate by professional and/or ethical standards.

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.

Doctoral Program

The doctoral degree in counselor education and supervision requires a minimum of 71 semester credits beyond the master's degree. Students must successfully complete required courses, electives, a 600 hour doctoral internship, comprehensive exams and a disquisition.

Required Courses

EDUC 703	Research, Measurement and Program Evaluation	3
CNED 767	Advanced Group Counseling	3
CNED 779	Quantitative and Survey Research	3
CNED 869	Instructional Theory and Practice in Counselor Education and Supervision	3
CNED 770	Counselor Supervision	3
CNED 787	Professional Issues: Professional Development, Consultation and Publishing	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 880	Ethical and Legal Issues in Counselor Education and Supervision	3
CNED 863	Advanced Clinical Assessment, Report Writing, & Treatment Planning	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 Career Education, Crisis Management Preparation, Trauma

Brenda Hall, Ed.D.

Virginia Polytechnic Institute and State University, 1993

Research Interests: Intimate Partner Violence, Relational – Cultural Theory, Community/School partnerships, Collaborative Group Practices Studies, and Substance Abuse Counseling

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, 2005

Research Interests: Shame and Shame Resilience, Women and Leadership, Faculty Development, Mentoring, and Counselor Education Counselor Supervision,

Robert C. Nielsen, Ed.D.

University of Northern Colorado, 1973

Research Interests: School Counseling, Stress Management, Cognitive Counseling

Couple and Family Therapy

Program and Application Information

Department Chair:

Dr. Joel Hektner

Program Coordinator:

Dr. Tom Stone Carlson

Department Phone:

701-231-8279

Department Web Site:

www.ndsu.edu/hdfs/prospective_students/graduate/cft/

Application Deadline: January 1
Degrees Offered: Ph.D.

Program Description

The CFT Program at NDSU is nationally recognized as a leading training program for its commitment to prepare scholars who are qualified to intervene in the problems that are most relevant in today's world. In particular, the program is committed to center all aspects of training in feminist and social justice principles to help students' develop the skills and competence necessary to work with diverse and marginalized communities as researchers, supervisors and clinicians and to use those skills to create meaningful social change at the national, international, and local levels.

Admission Requirements

1. Completed a Master's degree in a program accredited by the Commission on Accreditation for Marriage and Family Therapy Education
2. Taken at least one course in statistics and one course in research methods with a minimum B average
3. Completed an empirical Master's thesis

Financial Assistance

Graduate assistantships are available on a competitive basis.

1. Clinical contact in the on-campus therapy center
2. 180 hours of supervisory experience
3. One-year research, teaching, or clinical internship experience
4. A scholarly portfolio that includes (a) at least two proposals/abstracts for presentations at national conferences and (b) submission of at least two manuscripts for publication at peer-reviewed journals
5. A comprehensive/preliminary examination
6. Produce and defend a dissertation

Kristen Benson, Ph.D.

Virginia Polytechnical Institute and State University, 2008

Research Interests: Gender Identity and Family/Partner Relationships, Diversity Issues in Family Therapy, Collaborative Approaches to Family Therapy Education and Training, and Qualitative Methodology

Thomas Carlson, Ph.D.

Iowa State University, 2000

Research Interests: Family Therapy Training & Supervision; Fathering

Christie McGeorge, Ph.D.

University of Minnesota, 2005

Research Interests: Family Caregiving; Family Wellness; Premarital Counseling

Criminal Justice

Program and Application Information

Department Head:	Dr. Jeffrey Bumgarner
Graduate Coordinator:	Dr. Amy Stichman
Department Location:	Criminal Justice & Public Policy
Department Phone:	(701) 231-8567
Department Web Site:	www.ndsu.edu/cjps/criminal_justice/graduate_program/
Application Deadline:	April 1 for PhD applicants, Master's applications accepted for fall and spring enrollments on a rolling basis.
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE
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 topical curriculum is geared to understanding, critiquing, and analyzing the criminal justice system with an orientation toward urban issues as they impact crime and criminal justice. 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. Elective course work can include classes such as Violence, Gender and Justice, and crime commodities. 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 less 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.

Admission Requirements

Ph.D. in Criminal Justice

Students should enter the program with either a baccalaureate degree or 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/or 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) 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.

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). The amount of credit for the master's degree will be determined by the graduate coordinator. The curricular structure of the program is listed below for students entering the program with a master's degree in criminal justice/criminology:

Theory/Policy Courses		9
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills		15
CJ 734	Advanced Criminal Justice Methods	
STAT 725	Applied Statistics	
STAT 726	Applied Regression and Analysis of Variance (STAT 725 is a prerequisite for this course)	
CJ 702	Program Evaluation	
CJ 759	Advanced Research Design in Criminal Justice	
Electives		
Select 3 credits from the following:		3
CJ 607	Deviant Behavior	
CJ 768	Gender and Justice	
SOC 700	Qualitative Methods	
PSYC 640	Experimental Methods	
PSYC 670	Experimental Social Psychology	
STAT 660	Applied Survey Sampling	
STAT 665	Meta-Analysis Methods	
Substantive Areas		
Students must complete four courses in substantive area of choice (12 credits) plus complete one course (6 credits) in each of their non-substantive areas.		18

Area A – Criminology:		
CJ 606	Crime and Delinquency	
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	
CJ 750	Violence	
CJ 752	Criminogenic Commodities	
Area B - Corrections:		
CJ 707	Juvenile Corrections	
CJ 762	Community Corrections	
CJ 763	Correctional Rehabilitation	
CJ 764	Punishment and Society	
CJ 765	Classics in Policing	
Area C - Policing:		
CJ 754	Police and Society	
CJ 755	Administrative Policing	
CJ 760	Police and Race Issues	
CJ 761	Police Effectiveness	
Dissertation/Indep. Studies		
Dissertation/Indep. Studies		1-15
Total Credits		60

The curricular structure of the program is listed below for students entering the program with a master's degree that is not related to criminal justice/ criminology:

Theory/Policy Courses		9
CJ 703	Advanced Criminology	
CJ 709	Criminal Justice Policy	
COMM 702	Introduction to College Teaching in the Humanities and Social Sciences	
Research Skills		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 (STAT 725 is a prerequisite for this course)	
Electives		
Select 15 credits from the following:		15
CJ 607	Deviant Behavior	
PSYC 640	Experimental Methods	
STAT 660	Applied Survey Sampling	
STAT 665	Meta-Analysis Methods	
PSYC 670	Experimental Social Psychology	
SOC 700	Qualitative Methods	
CJ 768	Gender and Justice	
Substantive Areas		
Students must complete four courses in substantive area of choice (12 credits) plus complete one course (6 credits) in each of their non-substantive areas.		18
Area A – Criminology:		
CJ 606	Crime and Delinquency	
CJ 750	Violence	
CJ 752	Criminogenic Commodities	
CJ 721	Individual Theories of Crime	
CJ 722	Structural Theories of Crime	

Area B - Corrections:	
CJ 765	Classics in Policing
CJ 762	Community Corrections
CJ 707	Juvenile Corrections
CJ 763	Correctional Rehabilitation
CJ 764	Punishment and Society
Area C - Policing:	
CJ 754	Police and Society
CJ 755	Administrative Policing
CJ 760	Police and Race Issues
CJ 761	Police Effectiveness
Dissertation	
Dissertation	33
Total Credits	90

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.

Applied Track

Foundation Courses 18

Both Tracks require to completion of the following 6 foundation courses (18 credits total).

Advanced Criminology
 Criminal Justice Policy
 Program Evaluation
 Applied Statistics
 Advanced Criminal Justice Methods

Advanced Research Design

In addition to the foundation courses, students enrolled in the Applied Track must complete 1 course from two of the three areas (6 credits total).

Corrections

Select one of the following: 3

Corrections
 Community Corrections
 Crime Prevention
 Correctional Rehabilitation
 Juvenile Corrections

Policing

Select one of the following: 3

Criminalization
 Administrative Policing
 Community Policing
 Police Effectiveness
 Police and Race Issues

Thesis or Policy Paper/Indep. Studies 6

Thesis or Policy Paper/Indep. Studies

Total Credits 30

In addition to the Foundation Courses, students enrolled in the **Criminology Track** must complete 1 course from the Theory area (3 credits total) and 2 courses from the Elective Area (6 credits total).

Foundation Courses 18

Advanced Criminology

Criminal Justice Policy	
Program Evaluation	
Applied Statistics	
Advanced Criminal Justice Methods	
Advanced Research Design	
Theory	
Select one of the following:	3
Individual Theories of Crime	
Structural Theories of Crime	
Electives	
Select one of the following:	3
Crime and Delinquency	
Violence	
Criminogenic Commodities	
Deviant Behavior	
Advanced Psychopathology	
Thesis or Policy Paper/Indep. Studies	
Thesis or Policy Paper/Indep. Studies	6
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

Sarah Boonstoppel, Ph.D.

University of Maryland, College Park, 2014

Research Interests: Crime and the Life Course, Criminological Theory, Qualitative and Mixed Research Methods

Steven J. Briggs, Ph.D.

University of Nebraska-Omaha, 2007

Research Interests: Police Effectiveness, Police Discretion, Social Ecology of Crime

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 Attitude, Treatment Program Evaluation

Kevin M. Thompson, Ph.D.

University of Arizona, 1986

Research Interests: Delinquency, Quantitative Methods, Alcohol and Drugs, Juvenile Drug Courts

Developmental Science

Program and Application Information

Department Head:

Dr. Joel Hektner

Graduate Coordinator:

Dr. Elizabeth Blodgett Salafia

Email:

elizabeth.salafia@ndsu.edu

Department Location:

Evelyn Morrow Lebedeff Hall

Department Phone:

(701) 231-8268

Department Web Site:

www.ndsu.edu/hdfs/academic_programs_admission/graduate/ds/

Application Deadline:	February 1
Degrees Offered:	Ph.D.
Test Requirement:	GRE-General
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.

Admission Requirements

- Cumulative GPA of 3.0 or higher
- GRE

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
- 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>).
 - 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
- 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

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, including the master's thesis and master's oral examination.
- All courses 3 credits unless otherwise noted.
-

Didactic Core Courses

HDFS 703	Research Methods in Human Development and Family Science
HDFS 705	Quantitative Methods in Developmental Science
HDFS 802	Teaching Developmental Science
HDFS 812	Advanced Human Development: Birth Through Childhood
HDFS 814	Advanced Human Development: Adolescence Through Early Adulthood
HDFS 816	Advanced Human Development III: Middle through Late Adulthood

HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
Electives		13
Must include 6 credits in didactic 700 or 800-level courses in HDFS or other departments, including at least one course from:		
HDFS 824	Advanced Topics in Socioemotional Development	
HDFS 825	Advanced Topics in Cognitive Development	
Non-didactic Courses		10
HDFS 801	Graduate Orientation Seminar (1 credit)	
HDFS 805	Professional Development in Developmental Science (1 credit)	
HDFS 790	Graduate Seminar (to be taken 8 semesters 1 credit each)	
Independent Research		43
HDFS 793	Individual Study/Tutorial (22 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.

Didactic Courses		18
HDFS 802	Teaching Developmental Science	
HDFS 812	Advanced Human Development: Birth Through Childhood	
HDFS 814	Advanced Human Development: Adolescence Through Early Adulthood	
HDFS 816	Advanced Human Development III: Middle through Late Adulthood	
HDFS 854	Advanced Quantitative Methods in Developmental Science	
HDFS 856	Longitudinal Research Methods and Analysis	
Four more didactic 700-level courses; could be outside of HDFS (to be approved by committee)		
Electives--must include at least one course from:		6
HDFS 824	Advanced Topics in Socioemotional Development	
HDFS 825	Advanced Topics in Cognitive Development	
HDFS 826	700-level course in HDFS or other department	
Non-didactic Courses		
HDFS 801	Graduate Orientation Seminar	1
HDFS 805	Professional Development in Developmental Science	1
HDFS 790	Graduate Seminar (to be taken 5 semesters (1 credit each))	5
Independent Research		
HDFS 793	Individual Study/Tutorial	14
HDFS 899	Doctoral Dissertation	15
Total Credits		60

Other Requirements

- Teach one undergraduate course, with supervision (as part of assistantship or for course credit in HDFS 794 Practicum/Internship). Must have first taken HDFS 802 Teaching Developmental Science.
- 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 793 Individual Study/Tutorial, and/or HDFS 899 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

Margaret Fitzgerald, Ph.D.

Iowa State University, 1997

Research Interests: Financial Counseling and Planning; Husbands and Wives Who Own and Operate Family Businesses Together; Family Business and Economically Vulnerable/Viable Communities; Gender and Management Issues In Family Business

Heather Fuller-Iglesias, 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

Brandy A. Randall, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Elizabeth Blodgett Salafia, Ph.D.

University of Notre Dame, 2008

Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Rebecca Woods, Ph.D.

Texas A&M University, 2006

Research Interests: Perception and Cognition In Infancy; Object Processing; Multimodal Processing; Early Gender Differences

Affiliated Faculty with in HDFS

Kristen Benson, Ph.D.

Virginia Polytechnical Institute and State University, 2008

Research Interests: Gender Identity and Family/Partner Relationships, Diversity Issues in Family Therapy, Collaborative Approaches to Family Therapy Education and Training, and Qualitative Methodology

Christie McGeorge, Ph.D.

University of Minnesota, 2005

Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization From a Feminist Perspective

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

Ardith Brunt, Ph.D.,
Health, Nutrition and Exercise Science

Ann Burnett, Ph.D.,
Women's Studies

Erin Conwell, Ph.D.,
Psychology

Donna Grandbois, Ph.D.,
Nursing

Daniel Klenow, Ph.D.,
Emergency Management

Linda Langley, Ph.D.,
Psychology

Susan Ray-Degges, Ph.D.,
Apparel, Design and Hospitality Management

Larry Reynolds, Ph.D.,
Animal Sciences

Greg Sanders, Ph.D.,
Human Development & Education

Molly Secor-Turner, Ph.D.,
Nursing

Kevin Thompson, Ph.D.,
Criminal Justice and Political Science

Wendy Troop-Gordon, Ph.D.,
Psychology

Kim Vonnahme, Ph.D.,
Animal Sciences

Rachelle Vettern, Ph.D.,
Center for 4-H Youth Development

Education-Doctoral

Program and Application Information

Department Chair:	Dr. William Martin
Doctoral Graduate Coordinator:	Dr. Chris Ray
Department Location:	School of Education, FLC 210
Department Phone:	(701) 231-7921
Department Web Site:	www.ndsu.edu/education/education_doctoral_programs/
Application Deadline:	February 1
Degrees 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 will advance education research and practice and maintain the integrity and vitality of the profession. Our graduates will be 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 Ed.D. and Ph.D. degrees in Education, with an emphasis in either **Institutional Analysis** or **Occupational and Adult Education**.

The ***Institutional Analysis*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding institutional performance both inside and outside of formal education settings. This option area focuses on the role of assessment, evaluation, and other research and analysis techniques in supporting institutional planning, policy formation, and decision-making.

The ***Occupational and Adult Education*** curriculum was designed to provide the knowledge, skills and experiences necessary for understanding the nature, function, and scope of adult learning both inside and outside of formal educational settings. This option area focuses on preparing individuals to engage in lifelong learning, working with adults of all ages and in all settings.

Admission Requirements

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 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.

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.

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 advisor 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 advisor and committee, not just for an accumulation of 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:

EDUC 806	International and Comparative Education	3
EDUC 807	Diversity and Educational Policy	3
EDUC 808	Empowerment & Transformative Education	3

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

Institutional Analysis		
EDUC 831	Institutional Quality Control	3
EDUC 832	Assessment Techniques for Educational Institutions	3
EDUC 833	Strategic Planning for Institutional Improvement	3

Occupational and Adult Education

EDUC 851	Adult Learning
EDUC 852	Foundations of Occupational & Adult Education
EDUC 853	Instructional Methods for Adult Learners

Professional Emphasis Area

9-12

Myron Eighmy, Ed.D.

University of Minnesota, 1995

Research Interests: Higher Education Policy, Training and Human Resources Development, State and Federal Policy for Workforce Education and Training

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

Claudette Peterson, Ed.D.

Oklahoma State University, 2006

Research Interests: Adult Learning; Non-formal Learning; Learning Strategies; Instrumented Learning

Christopher Ray, Ph.D.

Oklahoma State University, 2007

Research Interests: : Institutional Effectiveness; Learning Outcomes Assessment; Instrument Development; Moral Development and Education; College Student Development

Elizabeth Roumell, Ph.D.

University of Wyoming, 2009

Research Interests: International and Comparative Education; Adult Learner Identity Development; Online and Distance Education; Policy Analysis

Nathan Wood, Ph.D.

University of Minnesota, 2006

Research Interests: Sociocultural Issues in Education; Identity Development; Preparation of Educational Researchers

Educational Leadership

Program and Application Information**Program Coordinator:**

Dr. Ann Trousdale Clapper

Department Location:

School of Education, FLC 210

Department Phone:

(701) 231-7202

Department Email:

c.nelson@ndsu.edu

Department Web Site:www.ndsu.edu/education/educational_leadership/**Application Deadline:**

Domestic application materials are due two months prior to the start of classes. International application materials must be received before May 1 for the fall semester and before August 1 for spring and summer semesters.

Degrees Offered:

Ed.S., M.S., M.Ed.

English Proficiency Requirements:

TOEFL iBT 88; IELTS 6.5

Program Description

The principal purpose of the Educational Leadership program is to provide professional/academic education for individuals preparing for leadership roles in PK-12 and higher education settings. These roles include teacher leadership, mid-level administrative positions (elementary school principal, secondary school principal or higher education administrator), and upper-level administrative positions such as superintendent of schools. Degrees offered include a 30-credit Master of Education (M.Ed.) in Educational Leadership-Teacher Leadership, a 36-credit Master of Education (M.Ed.) or Master of Science (M.S.) in Educational Leadership, and an Education Specialist (Ed.S.) degree. Programs meet certification requirements in the various areas appropriate to the North Dakota requirements for K-12 administration positions.

The program is accredited by the National Council for Accreditation of Teacher Education 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.

Admission Requirements

Required application materials for the

Education Specialist (Ed.S.) degree in Educational Leadership

- Official transcripts of all previous collegiate work, including one verifying graduation with a master's degree from an accredited institution;
- A cumulative GPA of 3.25 or higher in all graduate-level courses;
- Resume including credentials, licenses and certificates;
- Two references that evaluate the applicant's potential for success as a graduate student and as an educational leader; and
- A leadership essay.

Master of Education (M.Ed.) or the Master of Science (M.S.)

- 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.

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 an adviser assigned to her/him for assistance in filing a plan of study for consideration by the program.

Degree Requirements

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.

Thomas Hall, Ed.D.

University of South Dakota, 2005

Research Interests: Community Education, Adult Learning

Denise K. Lajimodiere, Ed.D.

University of North Dakota, 2006

Research Interests/Area of Expertise: Native American Female Leadership; Horizontal Violence/Relational Aggression and girl bullying among young Native females living on reservations

Ann Trousdale Clapper, Ed.D.

Drake University, 1991

Research Interests/Areas of Expertise: Student Assessment, Program Evaluation, Educational Change

Dennis Van Berkum, Ed.D.

University of South Dakota, 1990

Research Interests: School Law, Organizational Behavior, Leadership, the Principalship

Electrical and Computer Engineering

Program and Application Information

Department Chair:

Dr. Scott C. Smith

Graduate Coordinator:

Dr. Rajesh Kavasseri

Email:

Rajesh.Kavasseri@ndsu.edu

Department Location:

101 Electrical Engineering Building

Department Phone:

(701) 231-7019

Department Web Site:

www.ndsu.edu/ece/

Application Deadline:	February 28 for fall and October 15 for spring (openings may be very limited for spring)
Degrees 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.

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 (<http://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.

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.

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.

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.

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. 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.

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

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

Emergency Management

Program and Application Information

Department Chair:	Dr. Daniel Klenow
Email:	daniel.klenow@ndsu.edu
Graduate Coordinator:	Dr. Jessica Jensen
Department Location:	Minard Hall
Department Phone:	(701) 231-5595
Department Web Site:	www.ndsu.edu/emgt/
Application Deadline:	February 15 for fall semester
Degrees 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 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.

The master's and doctoral degree programs in emergency management at NDSU are campus-based. Potential students are encouraged to visit the campus and meet faculty and current graduate students.

Master of Science Degree

The comprehensive and challenging Master's degree programs in Emergency Management are 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.

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. Additionally, the degree program requires students to choose two areas of concentration built on courses from disciplines outside of emergency management to complement their emergency management educational foundation.

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 three written comprehensive exams (one on emergency management theory, one on the two functional areas in which the student has specialized, and one on research methods), 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.

Admissions Requirements

The Department of Emergency Management at NDSU is selective in choosing graduate applicants for entry into the master's and doctoral programs. 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.
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. Interviews will also evaluate the applicant's ability to engage in evidence-based reasoning.

We are most likely to accept doctoral applicants who demonstrate their understanding of the concepts included in the following list of books:

- Mileti, D. (ed) (1999). *Disasters by design: A reassessment of natural hazards in the United States*. Washington, DC: John Henry Press.
- Rubin, C. (ed) (2007). *Emergency Management: The American experience 1900-2006*. PERI.
- Sylves, R. (2008). *Disaster policy & politics*. Washington, DC: CQ Press.
- Tierney, K., Lindell, M., & Perry, R. (2001). *Facing the unexpected: Disaster preparedness and response in the United States*. Washington, DC: John Henry Press.
- Wisner, B., Blaikie, P., Cannon, T., & Davis, I. (2004). *At risk: Natural hazards, people's vulnerability and disasters*. New York: Routledge.

The emergency management faculty at NDSU believe that the best doctoral degree program in emergency management will be made up of a diverse student body. We welcome applicants to the doctoral degree program with master's degrees from a variety of disciplines; applicants from all countries; applicants with different professional backgrounds; and applicants with varying goals and interests. We want to ensure, however, that applicants entering the program are knowledgeable about emergency management and some of the literature that provides the foundation for the discipline. Therefore, when applicants are interviewed during the application process, the faculty expects that the best candidates will demonstrate their familiarity with the major concepts presented in the books listed above.

By asking potential doctoral students to enter the program with foundational knowledge of the emergency management literature, the department hopes to accomplish several goals. First, in reading the books on the reading list, prospective students will be able to confirm their desire to pursue a doctoral education in the discipline of emergency management. Second, the department assumes that students who undertake this reading in preparation for their application interview will be bright, motivated, and passionate about the study of emergency management. Third, and finally, a basic understanding of the emergency management literature will help students coming into the program from a variety of backgrounds succeed once they begin their studies at NDSU.

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

Core		
SOC 700	Qualitative Methods ¹	3
SOC 701	Quantitative Methods ^{1,2}	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

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.

Emergency Management Master's Comprehensive Study Track

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
Comprehensive Study Paper		
EMGT 797	Master's Paper	3
Total Credits		42

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

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
EMGT 730	Advanced Research Methods	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 seven courses)		21
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	
Practicum		
EMGT 794	Practicum/Internship ⁴	6
EMGT 895	Field Experience	1-15
Dissertation		
Dissertation		15
Total Credits		70-84

- 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 Other Electives (https://workspaces.ndsu.edu/typo3/#_edn4)
- ⁴ Practicum (https://workspaces.ndsu.edu/typo3/#_edn5)

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

Yue (Gurt) Ge, Ph.D.

Texas A&M, 2013

Research Interests: Land Use Planning & Emergency Planning, Hazard Mitigation & Disaster Recovery, Environmental Hazards Management, Spatial Analysis

Jessica Jensen, Ph.D.

North Dakota State University, 2010

Research Interests: Response, Recovery, and Preparedness, Voluntary Agencies in Disasters, Development of Emergency Management Academic Discipline

Daniel J. Klenow, Ph.D.

University of Notre Dame, 1977

Research Interests: Special Populations, International Disasters, Emergency Management Theory and Methodology

English

Program and Application Information**Department Chair:**

Dr. Gary Totten

Graduate Coordinator:

Dr. Miriam Mara

Email:

miriam.mara@ndsu.edu

Department Location:

318 Minard Hall

Department Phone:

(701) 231-7143

Department Web Site:

www.ndsu.edu/english/

Application Deadline:

To be considered for admission and a teaching assistantship, applications must be completed by February 1 for fall semester.

Degrees Offered:

M.A., Ph.D.

English Proficiency Requirements:

TOEFL iBT 100; IELTS 7

Master of Arts

The Department of English, through its master's program, offers students the opportunity for intellectual growth and personal development; careers in diverse fields such as education, government, technical communication, law, public relations, theology, business; and studies leading to advanced degrees in such fields as English, law, creative writing, religious studies, and education. The program requires ENGL 760 Graduate Scholarship, normally taken during the student's first or second semester in residence. The department emphasizes critical thinking as an essential approach to the writing of papers, the making of oral reports, and the study of language and literature.

Admissions Requirements

The Department of English 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 completed a major in English at the undergraduate level.

Financial Assistance

Teaching assistantships are available and are based on the applicant's scholastic record and letters of recommendation. However, the student must first make application to the Graduate School and be accepted for admission before she/he is eligible for an assistantship in the Department of English. Letters of application for teaching assistantships should be submitted at the same time as the application to the program is submitted to the graduate school and should specify experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. As of the 2014-15 academic year, the annual stipend is \$8,500. University graduate tuition charges (not fees) are waived for all TAs. Teaching Fellowships are available to selected TAs after completing course work. Moreover, the Department of English annually awards the Rooney Scholarship and the Madeline S. Giddings Scholarship (\$1,000) to deserving graduate students.

The Master of Arts program offers the option of completing 27 credit hours of letter-graded course work with an overall GPA of 3.0 or better, and a 3-credit master's paper. A thesis-oriented plan of study is also available with variable credit hours of letter-graded course work.

Completion of intermediate competency in one foreign language is required.

Within the first semester of graduate work, each student is assigned an academic adviser who helps in overseeing the student's course work and paper committee. Students who plan to pursue a Ph.D. after completing their M.A. degrees are encouraged to work closely with their respective advisers in choosing the courses which best prepare them for doctoral work.

A graduate student in English should enroll in no more than 3 credits of ENGL 793 Indiv Study/Tutorial, during his/her master's career. Exceptions are provided for through a graduate form signed by the chair of the department and the adviser.

Literature Option

Students must complete:

• ENGL 760	Graduate Scholarship *	3
ENGL 762	Critical Theory *	3
Six Credits British Literature **		6
Six Credits American Literature **		6
One course in Composition or Linguistics ***		3
Two Elective Courses (Literature recommended)		6
ENGL 797	Master's Paper	1-10
or ENGL 798	Master's Thesis	

* Graduate students in any of the options are strongly advised to take ENGL 760 Graduate Scholarship and, as appropriate, ENGL 762 Critical Theory in their first year in the program. Students in the Composition Track planning to complete their course work in two years must take ENGL 755 Composition Theory and ENGL 756 Composition Research when they are offered, as those two core courses alternate.

** ENGL 764 Classroom Strategies For TA'S for TAs may be used to satisfy one Composition requirement.

*** At least three credits must be in pre-1900 American or pre-1660 British and at least three credits must be in post-1900 American or post-1660 British. Three credits in multicultural or post colonial literature is recommended.

Composition Option

• *Students must complete:*

• ENGL 760	Graduate Scholarship *	3
ENGL 755	Composition Theory *	3
ENGL 756	Composition Research *	3
Three Elective Courses in Composition **		
One course in Literature		
One course in Linguistics		
One Elective Course		
ENGL 797 or ENGL 798	Master's Paper Master's Thesis	1-10

* Graduate students in any of the options are strongly advised to take ENGL 760 Graduate Scholarship and, as appropriate, ENGL 762 Critical Theory in their first year in the program. Students in the Composition Track planning to complete their course work in two years must take ENGL 755 Composition Theory and ENGL 756 Composition Research when they are offered, as those two core courses alternate.

** ENGL 764 Classroom Strategies For TA'S may be used to satisfy one Composition requirement.

Elizabeth Birmingham, Ph.D.

Iowa State University, 2000

Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.

Iowa State University, 1997

Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emeritus

University of Nebraska, 1971

Field: Medieval Literature, Modern Drama, Women's Studies

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

Alison Graham Bertolini, Ph.D.

Louisiana State University, 2009

Field: Contemporary American Literature, Gender Studies, Ethnic Literature, Postcolonial Literature

Linda L. Helstern, Ph.D.

Southern Illinois University-Carbondale, 2001

Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D.

University of Nebraska, 1981

Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Andrew Flood Mara, Ph.D.

University of New Mexico, 2003

Field: Technical and Professional Communication, New Media, Rhetoric and Composition

Miriam O'Kane Mara, Ph.D.

University of New Mexico, 2003

Field: Irish Modern and Contemporary Literature, Postcolonial Literature, Rhetorics of Medicine and Embodiment

Bruce Maylath, Ph.D.

University of Minnesota, 1994

Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D.

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.

Rensselaer Polytechnic Institute, 1988

Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Amy Rupiper Taggart, Ph.D.

Texas Christian University, 2002

Field: Writing and Rhetoric, Pedagogy, Literacy Studies

Verena Theile, Ph.D.

Washington State University, Pullman, 2006

Field: 16th-/17th-Century Literature, Early Modern Drama, European Literature, Cultural Theory

Gary Totten, Ph.D.

Ball State University, 1998

Field: Late 19th-/Early 20th-Century American Literature, Travel Literature, Multi-Ethnic American Literature

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

Rhetoric, Writing and Culture

Program and Application Information

Department Chair:	Dr. Gary Totten
Graduate Coordinator:	Dr. Miriam Mara
Email:	miriam.mara@ndsu.edu
Department Location:	219 Morrill Hall
Department Phone:	(701) 231-7143
Department Web Site:	www.ndsu.edu/english/phd_degree/
Application Deadline:	February 1 for fall semester only.
Degrees Offered:	Ph.D.
Test Requirement:	GRE (general)
English Proficiency Requirements:	TOEFL iBT 100; IELTS 7

Doctor of Philosophy

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.

Admission Requirements

- 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
 - scholarship 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 records
- when applicable, a letter stating your interest in and qualifications for a teaching assistantship.

Preferred additional materials:

- Practical and / or Professional writing sample not to exceed 10 pages

Financial Assistance

Teaching assistantships are available and are based on the applicant's scholastic record and letters of recommendation. However, the student must first make application to the Graduate School and be accepted for admission before she/he is eligible for an assistantship in the Department of English. Letters of application for teaching assistantships should be submitted at the same time as the application to the program is submitted to the graduate school and should specify experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. As of the 2014-15 academic year, the annual stipend is \$14,000. University graduate tuition charges (not fees) are waived for all TAs. Teaching Fellowships are available to selected TAs after completing course work. Moreover, the Department of English annually awards the Rooney Scholarship (2014: \$1,220) and the Madeline S. Gittings Scholarship (2014: \$1,000) to deserving graduate students.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits at NDSU. Students must take a minimum of 30 credits at the 700 level.

Students admitted to the Ph.D. are required to demonstrate foreign language competency by the time they begin to write the dissertation. Students may meet this requirement in one of the following ways:

1. Demonstrate advanced reading competency in one foreign language equivalent to successful completion of a second-semester, third-year (300-level, 6th semester) college language course.
2. Demonstrate intermediate reading competency in two foreign languages equivalent to successful completion of two second-semester, second-year (200-level, 4th semester) college language courses.
3. Demonstrate intermediate reading competency in one foreign language equivalent to successful completion of a second-semester, second-year (200-level, 4th semester) college language course and, in consultation with the student's advisor and the graduate director, demonstrate competency in one special research skill (written rationale will be required at time of request). See Graduate Handbook for additional information.

Within the first semester of graduate work, each student is assigned an academic adviser who helps in overseeing the student's plan of study. A graduate student in English should enroll in no more than 3 credits of ENGL 793, Individual Study/Tutorial, during his/her graduate career. Exceptions are provided for through a graduate form signed by the chair of the department and the adviser.

Plan of Study

Core Courses		6
ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 764	Classroom Strategies For TA'S	
Research Methods		6

ENGL 756	Composition Research	
ENGL 762	Critical Theory	
COMM 704	Qualitative Research Methods in Communication	
COMM 782	Theories of Persuasion	
HIST 701	Methods of Historical Research	
SOC 700	Qualitative Methods	
Didactic credits		33
18 credits must be in Rhetoric and Writing courses (two courses must be from English and two from Communication) and		
15 credits of Elective courses (any graduate-level class not listed elsewhere on the student's plan of study, approved by student's adviser).		
English studies courses (literature and linguistics)		24
Students may transfer in graduate credits in this area or take English 600 and 700 level literature and linguistics classes not listed as part of the English Ph.D.		
Experiential Learning		6
Teaching mentorships, field experiences, and internships, inside or outside the academy in research, administrative, editing, consulting, or writing roles		
Complete Doctoral Comprehensive Exams when 72 credits are complete. The dissertation proposal is submitted after the successful completion of the comprehensive exams.		
ENGL 899	Doctoral Dissertation	1-15

**Graduate students are strongly advised to take Core courses in their first year in the program or as soon as these courses are offered.*

Elizabeth Birmingham, Ph.D.

Iowa State University, 2000

Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.

Iowa State University, 1997

Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D., Emeritus

University of Nebraska, 1971

Field: Medieval Literature, Modern Drama, Women's Studies

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

Alison Graham Bertolini, Ph.D.

Louisiana State University, 2009

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Linda L. Helstern, Ph.D.

Southern Illinois University-Carbondale, 2001

Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D.

University of Nebraska, 1981

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Andrew Flood Mara, Ph.D.

University of New Mexico, 2003

Field: Technical and Professional Communication, New Media, Rhetoric and Composition

Miriam O'Kane Mara, Ph.D.

University of New Mexico, 2003

Field: Irish Modern and Contemporary Literature, Postcolonial Literature, Rhetorics of Medicine and Embodiment

Bruce Maylath, Ph.D.

University of Minnesota, 1994

Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D.

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.

Rensselaer Polytechnic Institute, 1988

Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Amy Rupiper Taggart, Ph.D.

Texas Christian University, 2002

Field: Writing and Rhetoric, Pedagogy, Literacy Studies

Verena Theile, Ph.D.

Washington State University, Pullman, 2006

Field: 16th-/17th-Century Literature, Early Modern Drama, European Literature, Cultural Theory

Gary Totten, Ph.D.

Ball State University, 1998

Field: Late 19th-/Early 20th-Century American Literature, Travel Literature, Multi-Ethnic American Literature

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

Entomology

Program and Application Information

Director:

Dr. Frank Casey, School of Natural Resource Sciences

Program Leader::

Dr. Jason Harmon

Email:

jason.harmon@ndsu.edu

Department Location:

202 Hultz Hall

Department Phone:

(701) 231-7582

Department Web Site:

www.ndsu.edu/entomology/

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.

Degrees Offered:

Ph.D., M.S.

English Proficiency Requirements:

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, provides students many opportunities for research and consultation. Students may conduct their research program under the direction of USDA scientists holding adjunct appointments in Department of Entomology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to entomological programs are fostered. Prospective students are encouraged to check the Department of Entomology website (<http://www.ndsu.edu/entomology/>) for the latest descriptions of the graduate program.

Admissions Requirements

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 provide a letter stating reasons for pursuing an advanced degree in entomology and expressing the applicant's research interests.

Applications should be submitted directly to the Graduate School..

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.

The program requires a minimum of 24 months of full-time study, during which an overall GPA of 3.0 or better must be maintained. 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.

Michigan State University, 1986

Research Interests: Insect Behavior, Insect-Plant Interactions, Resistance of Plants to Insects

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

Deirdre Prischmann-Voldseth, Ph.D.

Washington State University, 2005

Research interests: Agricultural Integrated Pest Management and Arthropod Ecology

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

Environmental Engineering

Program and Application Information

Interim Department Chair:

Dr. Dinesh Katti

Graduate Coordinator:

Dr. Kalpana Katti

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

Degrees Offered:

M.S.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

The Department of Civil Engineering offers a graduate program leading to a Master of Science degree in environmental engineering. The M.S. degree in environmental engineering is offered through a program designed to advance the technical knowledge, competence, and interdisciplinary understanding of the students and to prepare them for entering or advancing within the environmental engineering profession.

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. 810).

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

Eakalak Khan, Ph.D.

University of California, Los Angeles, 1997

Research Interests: Water and Wastewater Quality, Water and Wastewater Treatment, and Storm Water and Non-point Source Pollution

Wei Lin, Ph.D.

SUNY at Buffalo, 1992

Research Interests: Water and Wastewater Treatment, Hazardous Waste Management

G. Padmanabhan, Ph.D.

Purdue University, 1980

Research Interests: Stochastic Hydrology, Water Resource Systems, and Hydrologic Modeling

Robert Zimmerman, Ph.D. (adjunct)

North Dakota State University, 1991

Research Interests: Water and Wastewater Treatment, Solid Waste

Environmental and Conservation Sciences

Program and Application Information

Program Director:

Dr. Eakalak Khan

Department Location:

Department of Civil and Environmental Engineering, CIE 201

Department Phone:

(701) 231-7717

Department Web Site:

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.
Degrees 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 relationships between humans and the natural environment such as cultural and behavioral issues, policy, business and economics, and sustainable development.

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 offers a new philosophy of looking at complex problems. This discipline 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, landscape ecology, sustainable development, and conflict resolution are themes promoted by the field of Conservation Biology.

Environmental Social Sciences

Environmental Social Sciences discipline looks at interactions between humans and the environment which tend to be complex and often require interdisciplinary efforts to understand and manage. Environmental policy, environmental economics, environmental history, environmental communication, environmental sociology, and human ecology are examples of the fields of study.

Admissions Requirements

To be admitted to the Environmental and Conservation Sciences program, the applicant must meet the Graduate School requirements.

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 Student Financial Services for information and applications regarding scholarships.

Program Administration

The graduate program is administered by the ECS Steering Committee. The committee is composed of four ECS graduate faculty members representing four different colleges: Agriculture, Food Systems, and Natural Resources; Arts, Humanities, and Social Sciences; Engineering; and Science and Mathematics. Four alternate members are also selected to substitute on the committee when necessary. Steering Committee members, who serve overlapping three-year terms, are elected at a yearly meeting of the ECS faculty. 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 core 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).

Core Courses

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

GEOL 614	Hydrogeology	3
CE 770	Hazardous Waste Site Remediation	3
MICR 652	Microbial Ecology	3
MPH 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

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	Range Habitat Management
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

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
GEO 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 Physics
SOIL 733	Modeling Environmental Fate and Transport

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	Range Habitat Management
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
GEO 660	Biogeochemistry
GEO 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**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 Resource/Watershed Management
NRM 701	Terrestrial Resources Management
NRM 702	Natural Resources Management Planning
RNG 654	Wetland Resources Management
RNG 656	Range Habitat Management
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	Geographic Information Systems in Range Survey
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.

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

Peter Bergholz, Ph.D.

Michigan State University, 2007

Research Interests: Food Safety and Environmental Microbiology, Landscape Genomics

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

Malcolm G. Butler, Ph.D.

University of Michigan, 1980

Research Interests: Aquatic Invertebrate Biology, Limnology, Wetland Ecology

Patrick M. Carr, Ph.D.

Montana State University, 1989

Research Interests: Sustainable Agriculture, Cropping Systems

Frank X.M. Casey, Ph.D.

Iowa State University, 2000

Research Interests: Field and Laboratory Studies of Water Flow and Chemical Transport Processes

Larry Cihacek, Ph.D.

Iowa State University, 1979

Research Interests: Carbon Sequestration in Soils, Soil Physical Properties, Soil Management for Waste Disposal

Gary K. Clambey, Ph.D.

Iowa State University, 1975

Research Interests: Ecology and Biogeography, Environmental Analysis and Planning, Structure Function Relations in the Midwestern Ecosystems

Mark E. Clark, Ph.D.

University of Tennessee, 1996

Research Interests: Population Ecology, Landscape Ecology, Fish and Wildlife Ecology, Ecological Modeling, Spatial Modeling, Species Interactions

Dennis Cooley, Ph.D.

University of Rochester, 1995

Research Interests: Ethics of Science

Davis Cope, Ph.D.

Vanderbilt University, 1980

Research Interests: Partial Differential Equations, Numerical Methods, Applied Mathematics

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

Nathan Fisher, Ph.D.

University of Michigan, 2006

Research Interests: Ecological and Evolutionary of Bacterial Virulence

Ann-Marie Fortuna, Ph.D.

Michigan State University, 2001

Research Interests: Microbial and Soil Process Regulating Nutrient Cycling, Soil Health and Global Climate Change, Soil Health Indicators

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.

Gary A. Goreham, Ph.D.

South Dakota State University, 1985

Research Interests: Rural Sociology, Community, Family Research Methods, Sociology of Religion, Sociology of Agriculture

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

James W. Grier, Ph.D.

Cornell University, 1975

Research Interests: Animal Behavior and Ecology, Animal Population Dynamics, Applied Biostatistics, Philosophy of Research

Jason Harmon, Ph.D.

University of Minnesota, 2003

Research Interests: Environmental change; ecosystem services; population and community ecology

Marion O. Harris, Ph.D.

Michigan State University, 1986

Research Interests: Insect-Pest Management, Host-Plant Relationships

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

Linda Helstern, Ph.D.

Southern Illinois University-Carbondale, 2001

Research Interests: Writing, Literature and the Environment, Multicultural Literature

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

Donna Jacob, Ph.D.

University College, 2004

Research Interests: Wetland ecology, biogeochemistry, ecophysiology and ecotoxicology

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

Eakalak Khan, Ph.D.

University of California Los Angeles, 1997

Research Interests: Water Quality, Biological Process Development for Water and Wastewater Treatment, Storm water and Non-Point Source Pollution Control

Kenneth E. Lepper, Ph.D.

Oklahoma State University, 2001

Research Interests: Quaternary Geology and Age Dating

Adam R. Lewis, Ph.D.

Boston University, 2005

Research Interests: Long-term Climate Evolution, Antarctic Climate Evolution, and Glacial Geology

Wei Lin, Ph.D.

SUNY 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

Mark Meister, Ph.D.

University of Nebraska, 1997

Research Interests: Rhetorical and Critical Theory, Environmental Communication

Jennifer Momsen, Ph.D.

Rutgers, 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

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

G. Padmanabhan, Ph.D.

Purdue University, 1980

Research Interests: Hydrology, Water Resources, Hydraulic Engineering

Birgit Pruess, Ph.D.

Ruhr- Universität 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

Wendy L. Reed, Ph.D.

Iowa State University, 2000

Research Interests: Physiological Ecology, Wetland and Bird Ecology, Environmental Endocrinology

David A. Rider, Ph.D.

Louisiana State University, 1988

Research Interests: Insect Systematics, Biodiversity

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

Donald P. Schwert, Ph.D.

University of Waterloo, 1978

Research Interests: Quaternary Paleocology, Analysis of Fossil Insects

Halis Simsek, Ph.D.

North Dakota State University, 2012

Research Interests: Bioenvironmental Engineering

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

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

Dennis Wiesenborn, Ph.D.

Rice University, 1989

Research Interests: Refining, Fractionation and Conversion of Fats and Oils from Plants, Process Modeling for Biofuels and Renewable Products

Scott Wood, Ph.D.

Princeton University, 1985

Research Interests: Environmental Geochemistry, Radioactive Waste Disposal

George Youngs, Ph.D.

University of Iowa, 1981

Research Interests: Perceived Ethics of Genetically Modified Organisms, Sustainable Agriculture

George M. Linz, Ph.D.

North Dakota State University, 1982

Research Interests: Avian Ecology

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

Exercise Science and Nutrition

Program and Application Information

Program Coordinator:	Dr. Bryan Christensen
Department Phone:	701-231-6737
Department Web Site:	www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition/
Application Deadline:	January 15
Degrees Offered:	Ph.D.
English Proficiency Requirements:	TOEFL iBT 79 IELTS 6.5

Program Description

The Department of Health, Nutrition and Exercise Sciences (HNES) offers a doctoral program 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, metabolism, 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. Prevention and treatment of obesity, improving physical activity, and building community-based health enhancements across the lifespan are strengths of the HNES faculty.

Program Objectives

The purpose of the program is to train doctoral students in Exercise Science and Nutrition. The program requires coursework and 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.

Students will:

1. Acquire ability, knowledge, and research skills in Exercise Science and Nutrition
2. Conduct original research in Exercise Science and Nutrition
3. Gain experience with classroom teaching
4. Be prepared as professionals in Exercise Science and Nutrition

Career Opportunities

A doctorate 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.

Student's Entering with a Master's Degree

60 credits minimum

Research Core		15
STAT 725	Applied Statistics (6 additional credits in statistics, of which at least 3 must be from STAT department)	
HNES 710	Introduction to Research Design and Methods in HNES	
or HNES 777	Scholarly Writing and Presenting in HNES	
3 additional credits in research methodology for (PSY, HDFS or HNES)		
Required HNES Core		19
HNES 726	Nutrition in Wellness	
HNES 727	Physical Activity Epidemiology	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 790	Graduate Seminar (4.0 credits; 1.0 credits/semester required for each of the first two years enrollment)	
HNES 794	Practicum/Internship (Research Practicum)	9
Choose three courses from one of the following options:		9
Exercise Science		
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 713	Graduate Exercise Physiology	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise and Nutrition Science	
Nutrition		
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
Electives (maximum of 3.0 credits Independent Study)		4
HNES 794	Practicum/Internship (Teaching Practicum- May be waived with significant evidence of teaching experience based on committee approval.)	3-6
HNES 899	Doctoral Dissertation	10-15

Students Entering with a Bachelor's Degree

90 credits minimum

Research Core		21
STAT 725	Applied Statistics (6 additional credits in statistics, of which at least 3 must be from STAT department)	
HNES 710	Introduction to Research Design and Methods in HNES	
6 additional credits in research methodology for (PSY, HDFS or HNES)		
Required HNES Core		30
HNES 726	Nutrition in Wellness	
HNES 727	Physical Activity Epidemiology	
HNES 743	Obesity Across the Lifespan	
HNES 754	Assessment in Nutrition and Exercise Science	
HNES 790	Graduate Seminar (6.0 credits; 1.0 credits/semester required for each of the first three years enrollment)	
Choose One Of The Following Two Options		12
HNES 703	Graduate Biomechanics of Sport and Exercise	
HNES 713	Graduate Exercise Physiology	
HNES 760	Skeletal Muscle Physiology	
HNES 761	Physiological and Fitness Assessment in Exercise and Nutrition Science	
Nutrition		
HNES 652	Nutrition, Health and Aging	
HNES 655	Sports Nutrition	
HNES 721	Health Promotion Programming	
HNES 724	Nutrition Education	
HNES 794	Practicum/Internship (Research)	9-12
Electives (maximum of 6.0 credits Independent Study)		20
HNES 794	Practicum/Internship (Teaching-May be waived with significant evidence of teaching experience based on committee approval.)	3-6
HNES 899	Doctoral Dissertation	10-15

Thomas C. Barnhart, Ph.D.

University of New Mexico, 1978

Research Interests: Recreation Management, Playground Safety

Ardith Brunt, Ph.D.

Iowa State University, 1999

Research Interests: Nutrition, Gerontology

Wonwoo Byun, Ph.D.

University of South Carolina-Columbia, 2012

Research Interests: Physical Activity Epidemiology

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: Athletic Training

Joe Deutsch, Ph.D.

North Dakota State University, 2007

Research Interests: Physical Education Teacher Education; Coaching

Marty Douglas, Ph.D.

Michigan State University

Research Interests: Adapted Physical Activity

Kara Gange, Ph.D.

North Dakota State University, 2010
 Research Interests: Athletic Training

Julie Garden-Robinson, Ph.D.

North Dakota State University, 1994
 Research Interests: Nutrition and Food Safety

Nikki German, Ph.D.

North Dakota State University, 2008
 Research Interests: Athletic Training

Kyle Hackney, Ph.D.

Syracuse University, 2013
 Research Interests: Skeletal Muscle Physiology

Mary Larson, Ph.D.

University of North Dakota, 2008
 Research Interests: Health Promotion and Lifestyle Medicine

Jenny Linker, Ph.D.

University of Illinois Urbana-Champaign, 2011
 Research Interests: Physical Education; Teacher Preparation

Katie Lyman, Ph.D.

University of South Florida, 2014
 Research interests: Kinesio Tape®, Manual Medicine, Emergency Medicine

Yeong Rhee, Ph.D.

Oklahoma State University, 1999
 Research Interests: Trace Elements, Chronic Disease, Immune Function, Functional Foods

Sherri Nordstrom Stastny, Ph.D.

North Dakota State University, 2007
 Research Interests: Nutrition, Gerontology

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

Family and Consumer Science Education

Program and Application Information

Department Chair:	Dr. William Martin
Graduate Coordinator:	Dr. Mari Borr
Department Location:	School of Education, FLC 210
Department Phone:	(701) 231-7921
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.
Degrees 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 for 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: <http://www.hsidea.org/programs/fcsed/>.

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.

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.

Admissions 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.

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.

Degree Requirements

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.

Master of Science Program

Education Courses

EDUC 689	Teaching Students of Diverse Backgrounds	15
EDUC 751	Students and Their Learning	
EDUC 755	Exceptional Learners in the Secondary School Classroom	
EDUC 775	Content Area Reading	
EDUC 790	Graduate Seminar	

Major Concentration

H&CE 682P	Methods of Teaching Family and Consumer Sciences II: Professional Practices
H&CE 687P	Student Teaching
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
H&CE 774	Teaching Family and Consumer Science with Technology
H&CE 794	Practicum/Internship (with H&CE 682 & H&CE 772)

Total Credits**41**

Master of Education Program

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**

Choose from the following:

H&CE 724	Program Development In Vocational Education
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
H&CE 774	Teaching Family and Consumer Science with Technology
H&CE 787	Issues In Education
H&CE 790	Graduate Seminar
H&CE 795	Field Experience

Electives (as approved by adviser)

H&CE 794	Practicum/Internship
H&CE 798	Master's Thesis

Total Credits**30****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

Food Safety

Program and Application Information

Program Director:	Paul Schwarz
Email:	paul.schwarz@ndsu.edu
Department Phone:	(701) 231-7971
Application Deadline:	International applications are due May 1st for fall and August 1 for spring. Domestic applicants should apply at least one month prior to the start of the term.
Degrees Offered:	Ph.D., M.S., Certificate
Test Requirement:	GRE
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

The Food safety programs was founded in 2001 to help meet the increasing need for individuals with food safety expertise in government, business, and academia. The graduate program is interdisciplinary, and NDSU graduate faculty from several colleges participate in advising graduate students. The NDSU Graduate School administers the academic program, while the home department of the adviser handles assistantship and tuition waiver administration. Academic policies are under the governance of the Food Safety graduate program faculty.

Degrees Offered and the Graduate Certificate

Three programs are offered at the graduate level. Research project-based degrees include the Doctor of Philosophy (Ph.D.) and the Master of Science (M.S.). The thesis-based M.S. degree will prepare students for supervisory roles in the food industry, in regulatory agencies, or in public health and is preparatory for students who may wish to advance to Ph.D. programs. Individuals earning a Ph.D. degree will be educated as independent researchers, expanding their potential to become principal investigators of food safety research in various arenas, including business, academia, and government. The non-thesis M.S. is intended for working professionals looking to augment their skills or credentials. Most coursework can be completed online, although the candidate must be present on-campus to present seminar and also the M.S. paper. The Graduate Certificate in Food Protection is aimed at professionals looking to augment their skills, as well as graduate students in other programs wishing to add a credential to their degree programs. All course work for the Certificate is completed online.

Admissions Requirements

Admission, Advisor Assignment and Assistantships

Food Safety program admission is open to all qualified graduates of universities and colleges of recognized standing. Appropriate degrees might be in food science, food safety, meat science, cereal science, microbiology, veterinary science, economics, engineering, dietetics, nutrition, agricultural policies or communication. To be admitted with full status to the program, the applicant must meet the Graduate School admission requirements along with additional requirements:

Thesis based M.S.

- Submission of Graduate Record Examination (GRE) General Test scores that are lower than the 50th percentile will generally weaken an applicant's chance of being accepted. In all cases, other forms of evidence for academic success will be considered and may supersede the GRE score for evaluative outcomes.

Dissertation based Ph.D.

- Applicants with a completed M.S. degree (in any related field of study) are generally regarded as more prepared for the Ph.D. program than applicants with only a bachelor's degree.
- For students that have not already completed an M.S. degree at an institution in the United States, the Graduate Record Examination (GRE) General Test scores are required. Scores that are lower than the 50th percentile will generally weaken an applicant's chance of being accepted. Other forms of evidence for academic success will be considered and may supersede the GRE score for evaluative outcomes.

Graduate Certificate and Non-thesis option

- The Graduate Certificate in Food Protection does not require the Graduate Record Examination (GRE) General Test (GRE).
- Applicants to the non-thesis M.S. holding a bachelor's degree from a recognized U.S. institution are not required to complete the Graduate Record Examination (GRE) General Test. The GRE is required for International applicants to the non-thesis M.S. program. Other forms of evidence for academic success will be considered and may supersede the GRE score for evaluative outcomes.

The Graduate School does not forward applications for review to the program until the application package is complete. Failure to meet these program deadlines may result in rejection or postponement of admission. Common errors resulting in late applications include missing letters of recommendation and late payment of application fees.

Applications completed by the deadlines are forwarded from the Graduate School to the Food Safety Program director. These are then sent to the Food Safety faculty for review. Acceptance of the applicant will be judged by the faculty using a combination of factors, including those presented above, and on applicant's recommendation letters and statement of purpose. Applications of acceptable quality for the M.S. and Ph.D. programs may still be rejected if an adviser cannot be identified and if there is not an assistantship available to support the applicant.

Applications of acceptable quality for the Graduate Certificate will generally be accepted, unless enrollment caps are being enforced.

All applicants will be notified about final decisions as soon as possible, however, applicants should understand that processing may take several weeks after the deadlines.

Financial Assistance

Applicants must apply to the Graduate School and be accepted before being eligible for an assistantship in the Food Safety M.S and Ph.D. programs. Very limited funding is available through the Food Safety program itself. Assistantships are generally only available when faculty members have grant funding for support of a student. Graduate tuition is waived for students with assistantships. Teaching assistantships are occasionally available to qualified students. Alternative support, equivalent to a Graduate Research Assistantship may be provided to a student by an outside sponsor such as a private company, university or government.

Financial support is not available for the Graduate Certificate Program and the non-thesis M.S in Food Safety.

Doctor of Philosophy (Ph.D.)

For candidates who have been granted a M.S. from a recognized program, the Ph.D. program requires the completion of 35 semester credits of course work with an overall GPA of 3.0 or better, as well as 25 research credits (SAFE 899). Fifteen of these credits must be at the 700-789 level. The Ph.D. program is, by design, highly flexible to allow study in the diverse areas of specialization that are related to food safety. While a number of core courses, including SAFE 601-609, seminar (SAFE 790) and research (SAFE 899) are required, additional course work can be tailored to meet the candidate's interests and area of specialization. This additional course work, however, must contribute to proficiency in an area of food safety.

An advisory committee will be established for each candidate admitted. This committee will consist of the major adviser (committee chair), and two other selected graduate faculty. The student and major adviser will prepare the plan of study, which is subject to the approval of the advisory committee, the Food Safety program director, and the Graduate School dean. The plan of study should be completed by the end of the first semester of enrollment in the program.

Ph.D. candidates are required to pass a preliminary examination at least one semester prior to the defense of the dissertation. Two preliminary exam options are available. The first involves the standard written and oral examinations covering the candidate's course work. The second involves successful preparation and defense of a research grant proposal, under accepted guidelines (e.g. USDA-NIFA, NIH).

Core Courses (required)

SAFE 601	Food Safety Information & Flow of Food	1
SAFE 602	Foodborne Hazards	1
SAFE 603	Food Safety Risk Assessment	1
SAFE 604	Epidemiology of Foodborne Illness	1
SAFE 605	Costs of Food Safety	1
SAFE 606	Food Safety Crisis Communication	1
SAFE 607	Food Safety Risk Management	1
SAFE 608	Food Safety Regulatory Issues	1
SAFE 609	Food Safety Risk Communication & Education	1
SAFE 790	Graduate Seminar	2
SAFE 899	Doctoral Dissertation	1-15

Course Options

Food Safety

SAFE 652	Food Laws and Regulations	3
SAFE 684	Food Safety Practicum	1-3
SAFE 753	Food Toxicology	2
SAFE 785	Advanced Crisis Communication	3
SAFE 786	Risk Communication	3

Microbiology

MICR 653	Food Microbiology	3
MICR 674	Epidemiology	3
MICR 724	Applied Epidemiology and Biostatistics	3
MICR 750	Advanced Topics in Epidemiology	3
MICR 752	Advanced Food Microbiology	3

Depending upon the candidate's area of specialization, additional course work may be found in programs such as Agribusiness and Applied Economics (AGEC), Agricultural & Biosystems Engineering (ABEN), Animal Sciences (ANSC), Cereal and Food Sciences (CFS), Chemistry (CHEM), Communication (COMM), Health, Nutrition & Exercise Sciences (HNES), Master of Public Health (MPH), Plant Pathology (PPTH), Plant Sciences (PLSC), and Statistics (STAT).

Total Credits 90

Master's of Science (M.S. thesis option)

The Master of Science (thesis) is a research degree and can prepare the candidate for future study at the doctoral level. The candidate will perform a novel research project designed to contribute to the body of knowledge in some area pertinent to food safety, prepare a thesis on this research, and defend it in a final oral examination administered by the advisory committee. This program requires a total of 30 semester credits with an overall GPA of 3.0 or better. A minimum of 21 credits of course work, as well as 6-10 research credits must be completed. A minimum of 16 of these credits must be didactic (600-689 or 700-789). SAFE 601-609, seminar (SAFE 790) and research (SAFE 798) are required. Remaining course work can be tailored to meet the candidate's interests and area of specialization.

An advisory committee will be established for each candidate admitted. This committee will consist of the major adviser (committee chair), and two other selected graduate faculty. Additionally, the Graduate School will appoint an outside member of the committee. The student and major adviser will prepare the plan of study, which is subject to the approval of the advisory committee, the Food Safety program director, and the Graduate School dean. The plan of study should be completed by the end of the first semester of enrollment in the program.

Core Courses (required)

SAFE 601	Food Safety Information & Flow of Food	1
SAFE 602	Foodborne Hazards	1
SAFE 603	Food Safety Risk Assessment	1
SAFE 604	Epidemiology of Foodborne Illness	1
SAFE 605	Costs of Food Safety	1
SAFE 606	Food Safety Crisis Communication	1
SAFE 607	Food Safety Risk Management	1
SAFE 608	Food Safety Regulatory Issues	1
SAFE 609	Food Safety Risk Communication & Education	1
SAFE 790	Graduate Seminar	2

Course Options

MICR 798	Master's Thesis	6-10
Food Safety		
SAFE 652	Food Laws and Regulations	3
SAFE 684	Food Safety Practicum	1-3
SAFE 753	Food Toxicology	2
SAFE 785	Advanced Crisis Communication	3
SAFE 786	Risk Communication	3
Microbiology		
MICR 653	Food Microbiology	3
MICR 674	Epidemiology	3
MICR 724	Applied Epidemiology and Biostatistics	3
MICR 750	Advanced Topics in Epidemiology	3
MICR 752	Advanced Food Microbiology	3

Depending upon the candidate's area of specialization, additional course work may be found in programs such as Agribusiness and Applied Economics (AGEC), Agricultural & Biosystems Engineering (ABEN), Animal Sciences (ANSC), Cereal and Food Sciences (CFS), Chemistry (CHEM), Communication (COMM), Health, Nutrition & Exercise Sciences (HNES), Master of Public Health (MPH), Plant Pathology (PPTH), Plant Sciences (PLSC), and Statistics (STAT).

Total Credits 30

Master of Science (M.S. non-thesis option)

The Master of Science (non-thesis) is intended for working professionals seeking additional food safety knowledge and credentials. Selection of candidates into this program is very competitive, and is largely based upon the prior experience of the candidate. Identification of an adviser is key. The majority of course work for this program can be completed online, but several visits to the NDSU Fargo campus will be required for seminar and the defense of the final M.S. paper. No financial support is available for candidates in this program, including expenses for travel.

The non-thesis M.S. program requires a total of 30 semester credits with an overall GPA of 3.0 or better. A minimum of 21 credits of course work, as well as 2-4 research paper credits must be completed. A minimum of 16 of these credits must be approved for graduate credit (600-689 or 700-789). SAFE 601-609, seminar (SAFE 790) and Masters paper (SAFE 797) are all required. Remaining course work can be tailored to meet the candidate's interests and area of specialization.

An advisory committee will be established for each non-thesis M.S. candidate admitted. This committee will consist of the major adviser (committee chair), two other food safety faculty, and one recommended by the Graduate School. The student and major adviser will prepare the plan of study, which is subject to the approval of the advisory committee, the Food Safety program director, and the Graduate School dean. The plan of study should be completed by the end of the first semester of enrollment in the program.

The following table only shows courses which are available online. Candidates are encouraged to work with their adviser and the Food safety Program director to determine additional courses that utilize the Tegrity lecture capture program, and thus might be available to students who cannot regularly attend course lectures. Instructor requirements for Tegrity classes can vary widely.

Core Courses (required)

SAFE 601	Food Safety Information & Flow of Food	1
SAFE 602	Foodborne Hazards	1
SAFE 603	Food Safety Risk Assessment	1
SAFE 604	Epidemiology of Foodborne Illness	1
SAFE 605	Costs of Food Safety	1
SAFE 606	Food Safety Crisis Communication	1
SAFE 607	Food Safety Risk Management	1
SAFE 608	Food Safety Regulatory Issues	1
SAFE 609	Food Safety Risk Communication & Education	1
SAFE 790	Graduate Seminar (not on-line)	2
MICR 797	Master's Paper	3

On-line Course Options

SAFE 652	Food Laws and Regulations	3
SAFE 684	Food Safety Practicum	1-3
SAFE 753	Food Toxicology	2
SAFE 785	Advanced Crisis Communication	3
SAFE 786	Risk Communication	3

Depending upon the candidate's area of specialization, additional course work may be found in programs such as Agribusiness and Applied Economics (AGEC), Agricultural & Biosystems Engineering (ABEN), Animal Sciences (ANSC), Cereal and Food Sciences (CFS), Chemistry (CHEM), Communication (COMM), Health, Nutrition & Exercise Sciences (HNES), Master of Public Health (MPH), Plant Pathology (PPTH), Plant Sciences (PLSC), and Statistics (STAT).

Total Credits		30
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Graduate Certificate in Food Protection Requirements

To be admitted to this program, students must demonstrate that they have a baccalaureate degree in an area pertinent to food safety from an accredited educational institution of recognized standing. To obtain a Graduate Certificate in Food Protection, students must successfully complete the nine (9) semester credits of core curriculum below and earn a grade of B or better in each course. All courses are offered online. Certificate students are assigned an adviser. No assistantships are available for Certificate applicants.

SAFE 601	Food Safety Information & Flow of Food	1
SAFE 602	Foodborne Hazards	1
SAFE 603	Food Safety Risk Assessment	1
SAFE 604	Epidemiology of Foodborne Illness	1
SAFE 605	Costs of Food Safety	1
SAFE 606	Food Safety Crisis Communication	1
SAFE 607	Food Safety Risk Management	1
SAFE 608	Food Safety Regulatory Issues	1
SAFE 609	Food Safety Risk Communication & Education	1

Total Credits		9
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Peter Bergholz, Ph.D.

Assistant Professor

Michigan State University, 2007

Department: Veterinary and Microbiological Sciences

Research Interests: Disease Transmission, Landscape Genomics

Teresa Bergholz, Ph.D.

Assistant Professor

Michigan State University, 2007

Department: Veterinary and Microbiological Sciences

Research Interests: Foodborne Disease

Nathan Fisher, Ph.D.

Assistant Professor

University of Michigan, 2006

Department: Veterinary and Microbiological Sciences

Research Interests: Bacterial Endospores, Sanitation/Disinfection Technologies, Infectious Disease

Julie Garden-Robinson, Ph.D.

Extension Specialist, Professor

North Dakota State University, 1994

Department: Health, Nutrition, and Exercise Sciences; NDSU Extension

Teaching and Research Interests: Nutrition, Food Safety

Penelope Gibbs, Ph.D.

Associate Professor

University of Georgia, 2001

Department: Veterinary and Microbiological Sciences

Research Interests: Virulence of *Cronobacter sakazakii*-induced Meningitis in Humans and *Moraxella bovis*-induced Pinkeye in Bovine Species

Clifford A. Hall III, Ph.D.

Food Science Undergraduate Program Coordinator, Associate Professor

University of Nebraska-Lincoln, 1996

Department: Plant Sciences, Cereal and Food Science Program

Research Interests: Phytochemical Stability in Food Systems, Pulse Utilization and Quality, Flaxseed, Chemical Food Safety, Effect of Processing on Food Safety Issues

Robert Littlefield, Ph.D.

Professor

University of Minnesota, 1983

Department: Communication

Teaching and Research Interests: Culture-centered Food Usage and Communication, Risk and Crisis Communication

Robert Maddock, Ph.D.

Extension Meats Specialist, Associate Professor

Texas A&M, 2000

Department: Animal Science; NDSU Extension

Teaching and Research Interests: Meat Processing, HACCP Systems

Deland Myers Sr., Ph.D.

Director of Academic Diversity Recruitment, NDSU Faculty Athletic Representative, Professor

Iowa State University, 1984

Department: Plant Sciences, Cereal and Food Science Program

Research Interests: Utilization of Legume and Cereal Proteins in Nonfood, Food Applications and Their Functionality

William Nganje, Ph.D.

Department Chair, Professor

University of Illinois at Urbana-Champaign, 1999

Department: Agribusiness and Applied Economics

Teaching and Research Interests: Risk Management, Economics of Obesity, Food Safety, and Food Terrorism

Birgit Pruess, Ph.D.

Associate Professor

Ruhr-Universität Bochum Germany, 1991

Department: Veterinary and Microbiological Sciences

Research Interests: Bacterial Physiology and Biofilms

David Saxowsky, J.D.

Associate Professor

Ohio State University, 1979

Department: Agribusiness and Applied Economics

Teaching and Research Interests: Applied Agriculture Law, Food Law, Water Law

Paul B. Schwarz, Ph.D.

Food Safety Program Director, Professor

North Dakota State University, 1987

Department: Plant Sciences, Cereal and Food Science Program

Research Interests: Mycotoxins in Cereal Grains and Products

Kalidas Shetty, Ph.D.

Associate Vice President of International Partnerships and Collaborations, Professor
University of Idaho, 1989
Department: Plant Sciences
Research Interests: Plant Metabolism, Food Security

Senay Simsek, Ph.D.

Bert L. D'Appolonia Endowed Associate Professor
Purdue University, 2006
Department: Plant Sciences, Cereal and Food Science Program
Research Interests: Wheat Mycotoxins In Relation To End-Product Quality

Charlene Wolf-Hall, Ph.D.

Vice-Provost for Academic Affairs, Professor
University of Nebraska-Lincoln, 1995
Department: Veterinary and Microbiological Sciences
Teaching Interests: Toxicology

Genomics and Bioinformatics

Program and Application Information

Program Director:

Dr. Phillip McClean

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.

Degrees Offered:

Ph.D. M.S.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

Genomics and Bioinformatics is an interdisciplinary graduate program that involves faculty from nine departments. Advanced research and study will focus on either functional or computation genomics. The program is designed to provide both M.S. and Ph.D. students the necessary skills and intellectual background to work cooperatively with others in a research area that takes a 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.

Admissions Requirements

It is the intent of the program to admit students in either of two 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 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 B.S. degree with courses in genetics, physiology, biochemistry; an upper-division statistics class; an introductory biology class emphasizing molecular biology; and minimum undergraduate GPA of 3.0.

Computational Bioinformatics track: a B.S. degree with courses in calculus, comparative computer languages, data structures, an upper-division statistics class, an introductory biology class emphasizing molecular biology, and minimum undergraduate GPA of 3.0.

Students can be accepted conditionally into either track without meeting the course or GPA requirements, but will be required to meet those requirements while in residency.

Research

The student is required to perform original research in an area of genomics. This will be under the direction of the student's major adviser. To promote cross-disciplinary research, the student is encouraged to collaborate with a student in the other track. This does not apply to M.S. students pursuing the Comprehensive Study Option.

Adviser and Graduate Committee

During the first year, the student will select an adviser, 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 and Bioinformatics program, and the Graduate School appointee. For Ph.D. students only, one member of the committee must be from outside the student's home college.

Core Courses

PLSC 611	Genomics	3
CSCI/MATH/STAT 732	Introduction To Bioinformatics	3
PLSC/BIOC 721	Genomics Techniques	2
796 Current Topics in Genomics 2 [2 x 1 cr. (MS)] or 3 [3 x 1 cr. (Ph.D.)] cr		2-3
790 Graduate Seminar 1 (M.S.) or 2 (Ph.D.) cr		1-2

Ph.D. Program

Functional Genomics Option

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) BIOL 859 Evolution , PLSC 631 Intermediate Genetics, STAT 726 Applied Regression and Analysis of Variance
- Electives minimum of 15 credits from the Physiology, Gene Expression, Genetics and Computational Elective areas; one course from each of the Physiology, Gene Expression, Genetics elective areas is required
- Research to 90 credits total (**NOTE: a minimum of 15 didactic credits must be 700-level courses**)

Bioinformatics Option

- Ph.D. Core Courses 13 credits
- Support Courses (required unless on incoming transcript) PLSC 731 Plant Molecular Genetics, STAT 661 Applied Regression Models, CSCI 796 Special Topics
- Electives - minimum of 15 credits; a minimum of three courses must be from the Computational area and a minimum of one course must be from either the Physiology, Gene Expression or Genetics Elective areas
- Research to 90 credits total (**NOTE: a minimum of 15 didactic credits must be 700-level courses**)

Elective Areas

Physiology

ANSC 828	Advanced Reproductive Biology	3
MICR 670	Basic Immunology	3
MICR 680	Bacterial Physiology	3
MICR 781	Advanced Bacterial Physiology	3
PPTH 751	Physiology Of Plant Disease	3
ZOO 660	Animal Physiology	3
ZOO 664	Endocrinology	3
ZOO 682	Developmental Biology	3
ZOO 866	Advanced Animal Behavior	3

Gene Expression

BIOC 719	Molecular Biology of Gene Expression and Regulation	3
BOT 820	Advanced Cell Biology	3
MICR 775	Molecular Virology	3
PLSC 731	Plant Molecular Genetics	3

Genetics

BIOL 859	Evolution	3
BIOL 796	Special Topics	3
MICR 682	Bacterial Genetics and Phage	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 780	Population Genetics	2
PLSC 781	Quantitative Genetics	2
PPTH 759	Host-Parasite Genetics	3
Computational		
CSCI 724	Survey of Artificial Intelligence	3
CSCI 859	Computational Methods in Bioinformatics	3
CSCI 760	Dynamic Programming	3
CSCI 765	Introduction To Database Systems	3
CSCI 783	Topics In Software Systems	3
CSCI 796	Special Topics (Knowledge Discovery in Biological Data)	3
CSCI 796	Special Topics (Signal Processing and Analysis in Bioinformatics)	3
MATH 684	Mathematical Methods of Biological Processes	3
STAT 650	Stochastic Processes	3
STAT 661	Applied Regression Models (required for Bioinformatics Ph.D. option)	3
STAT 730	Biostatistics	3
STAT 764	Multivariate Methods	3
STAT 796	Special Topics (required for Bioinformatics Ph.D. option)	3

M.S. Program - Thesis Option

Functional Genomics Option

- M.S. Core Courses 11 credits
- Electives- minimum of 9 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Research to 30 credits total

Bioinformatics Option

- M.S. Core Courses 11 credits
- Electives - minimum of 9 credits; a minimum of one course must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area
- Research to 30 credits total

M.S. Program - Comprehensive Study Option

Functional Genomics Option

- M.S. Core Courses 11 credits
- Electives- minimum of 15 credits from the Physiology, Gene Expression, and Genetics areas; a minimum of one course must be selected from each of two of these areas
- Masters Paper to minimum of 30 credit total

Bioinformatics Option

- M.S. Core Courses 11 credits
- Electives - minimum of 15 credits; a minimum of two courses must be from the Physiology, Gene Expression or Genetics Elective areas; the remainder of the courses must be from the Computational area

Masters Paper to minimum of 30 credit total

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 (M.S. and Ph.D.):** The final exam will be an oral defense of the student's research results. The student's graduate committee will administer the exam.
3. **Comprehensive Study Option Paper (M.S. only):** M.S. students pursuing the Comprehensive Study Option will be required to complete an in-depth paper of a specific topic relevant to Genomics. The paper will be reviewed and accepted by the student's graduate committee.

Peter Bergholz, Ph.D.

Michigan State University, 2007
Department: Veterinary and Microbiological Sciences
Research Interest: Bacterial Population and Landscape Genomics

Eugene Berry, Ph.D.

Northeastern University, 1983
Department: Veterinary and Microbiological Sciences
Research Interest: Animal Virology

Xiwen Cai, Ph.D.

Washington State University, 1998
Department: Plant Sciences
Research Interest: Cytogenetics

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

Nathan Fisher, Ph.D.

University of Michigan, 2006
Department: Veterinary and Microbiological Sciences
Research Interest: Functional Genomics and Gene Exaptation

Timothy Friesen, Ph.D.

North Dakota State University, 2001
Department: Plant Pathology
Research Interest: Host-Pathogen Interactions of Cereals

David P. Horvath, Ph.D.

Michigan State University, 1993
Department: Plant Sciences
Research Interest: Perennial Weed Physiology

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

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978
 Department: Computer Science
 Research Interest: Bioinformatics

William Perrizo, Ph.D.

University of Minnesota, 1972
 Department: Computer Science and Operation Research
 Research Interest: Distributed Database Systems, Centralized Database Systems

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

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

Yarong Yang, Ph.D.

Northern Illinois University, 2010
 Department: Statistics
 Research interest: Bioinformatics

Gerontology

Program and Application Information

Program Coordinator:	Gregory Sanders
Department Phone:	(701) 231-8272
Application Deadline:	Based on first major requirements.
Degrees 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, or Occupational and Adult Education) 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.

ADHM 705	Environment and Aging	3
HDFS 722	Methods and Theories in Gerontology	3
HDFS 760	Aging Policy	3
HDFS 816	Advanced Human Development III: Middle through Late Adulthood	3
HNES 652	Nutrition, Health and Aging	3
or HNES 726	Nutrition in Wellness	
or HNES 727	Physical Activity Epidemiology	

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

Program and Application Information

Department Head:	Dr. Margaret Fitzgerald
Graduate Coordinator:	Dr. Bryan Christensen
Email:	Bryan.Christensen.1@ndsu.edu
Department Location:	Bentson Bunker Fieldhouse
Department Phone:	(701) 231-6737
Department Web Site:	www.ndsu.edu/hnes/
Application Deadline:	Ph.D. Exercise Science and Nutrition: January 15 for fall only M.S. HNES - Exercise/Nutrition Science option: March 1 for fall only; M.S. Dietetics (online), GPIDEA: March 1 for fall only M.S. HNES - Leadership in Physical Education and Sport option: Enrollment is limited to 20 students.
Degrees Offered:	M.S., MATrg, Ph.D.
Test Requirement:	GRE required only for Ph.D. and for M.S. HNES - Exercise/Nutrition Science option
English Proficiency Requirements:	TOEFL ibT 100; IELTS 7

Program Description

The Department of Health, Nutrition, and Exercise Sciences (HNES) offers graduate study leading to the Master of Science (M.S.) degree in HNES with options in Exercise/Nutrition Science and Leadership in Physical Education and Sport. The HNES department also offers a Master of Science (M.S.) in Dietetics (on line through the Great Plains Interactive Distance Education Alliance), Master of Science (M.S.) in Advanced Athletic Training (http://www.ndsu.edu/hnes/advanced_athletic_training_post_professional) and a Master of Athletic Training (MATrg) (http://www.ndsu.edu/hnes/athletic_training_professional) degree. A Ph.D. degree in Exercise Science and Nutrition (http://www.ndsu.edu/hnes/phd_in_exercise_science_and_nutrition) is also available.

Exercise/Nutrition Science Option

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 athletic trainers, nutrition, and exercise science graduates.

Leadership in Physical Education and Sport Option

The Leadership in Physical Education and Sport (LPES) option is an online program that prepares teachers and coaches 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, etc.)

Students not meeting the above admission requirements may be accepted into the program with Conditional Standing by providing evidence that their potential as a graduate student is not adequately reflected by their academic record. Evidence from the applicant will include a written essay, and either a portfolio of professional accomplishments based on the Leadership in Physical Education and Sport (LPES) program standards and competencies, or GRE scores. Applicants who score in the upper 50th percentile in the verbal, quantitative, and writing portions will be given preference in admission to the program. Meeting these criteria does not guarantee automatic acceptance. Contact the program coordinator for a copy of the (LPES) standards and competencies.

Dietetics (On-line)

The 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).

In a multi-institution degree program, students:

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.

A Dietetics graduate candidate must complete a minimum of 36 credit hours to earn a Master of Science degree. Students will complete a six-credit research thesis.

Admissions Requirements

In addition to Graduate School admission requirements, the following criteria will be considered at the time of application for admission into graduate study. Admission to a master's degree program is considered ONLY after all required application materials have been received and reviewed. In order to be considered, the applicant must have:

- Bachelor of Science degree in an HNES related field from an accredited institution,
- Overall undergraduate GPA of 3.0 on a 4.0 scale,
- submitted all required materials as listed.
- The GRE is required for the Ph.D. and the Exercise/Nutrition Science option of the M.S. degree.

During the application process, the applicant must submit an exhibit of his/her written competency through an essay discussing professional philosophy and professional goals. 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.

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 Exercise/Nutrition Science option. Graduate assistants teach approximately six credits each semester, 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

Required Courses

HNES 790	Graduate Seminar (Introduction to HNES)	1
HNES 710	Introduction to Research Design and Methods in HNES	3
STAT 725	Applied Statistics	3

HNES 713	Graduate Exercise Physiology (Restricted to students enrolled in the Exercise Science/Nutrition Option)	3
HNES 726	Nutrition in Wellness	3
Electives (at least 3 cr. outside of HNES)		12
HNES 798	Master's Thesis	6

Leadership in Physical Education and Sport Option

HNES 700	Research in Physical Education and Sport	3
HNES 701	Leadership and Entrepreneurship	3
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 711	Physical Education Curriculum	3
HNES 712	Supervision and Management	3
HNES 714	Legal Liability in HPER	3
HNES 731	Governance in Sport	3
HNES 794	Practicum/Internship	3
or HNES 797	Master's Paper	
or HNES 798	Master's Thesis	

Dietetics Option

Required 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 724	Nutrition Education	
HNES 726	Nutrition in Wellness	
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 746	Nutrition and Health Disparities	
HNES 747	Understanding Food Culture	
HNES 750	Advanced Human Nutrition	
HNES 751	Metabolism of Micronutrients	
HNES 752	Phytochemicals	
HNES 755	Advanced Clinical Nutrition	
HNES 756	Pediatric Clinical Nutrition	
HNES 757	Nutritional Aspects of Oncology	
HNES 758	Clinical Aspects of Nutrition Support	
HNES 759	Nutrition and Immunology	

Total Credits**36****Thomas C. Barnhart, Ph.D.**

University of New Mexico, 1978

Research Interests: Recreation Management, Playground Safety

Ardith Brunt, Ph.D.

Iowa State University, 1999

Research Interests: Nutrition, Gerontology

Wonwoo Byun, Ph.D.

University of South Carolina-Columbia, 2012

Research Interests: Physical Activity Epidemiology

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: Athletic Training

Joe Deutsch, Ph.D.

North Dakota State University, 2007

Research Interests: Physical Education Teacher Education; Coaching

Marty Douglas, Ph.D.

Michigan State University

Research Interests: Adapted Physical Activity

Kara Gange, Ph.D.

North Dakota State University, 2010

Research Interests: Athletic Training

Julie Garden-Robinson, Ph.D.

North Dakota State University, 1994

Research Interests: Nutrition and Food Safety

Nikki German, Ph.D.

North Dakota State University, 2008

Research Interests: Athletic Training

Kyle Hackney, Ph.D.

Syracuse University, 2013

Research Interests: Skeletal Muscle Physiology

Mary Larson, Ph.D.

University of North Dakota, 2008

Research Interests: Health Promotion and Lifestyle Medicine

Jenny Linker, Ph.D.

University of Illinois Urbana-Champaign, 2011

Research Interests: Physical Education; Teacher Preparation

Katie Lyman, Ph.D.

University of South Florida, 2014

Research interests: Kinesio Tape®, Manual Medicine, Emergency Medicine

Yeong Rhee, Ph.D.

Oklahoma State University, 1999

Research Interests: Trace Elements, Chronic Disease, Immune Function, Functional Foods

Sherri Nordstrom Stastny, Ph.D.

North Dakota State University, 2007

Research Interests: Nutrition, Gerontology

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

Program and Application Information

Department Head:	Dr. John K. Cox
Graduate Coordinator:	Dr. Thomas Isern
Department Location:	422 Minard
Department Phone:	(701) 231-8654
Department Email:	ndsu.history@ndsu.edu
Department Web Site:	ndsuhistory.org/ (http://ndsuhistory.org)
Application Deadline:	April 1, for assistantship consideration
Degrees 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 program since the Graduate School was founded in 1954. In 2002, a joint program for a Ph.D. in History was instituted between NDSU and the University of North Dakota. A complete program description follows the M.S./M.A. requirements. The graduate faculty also provides instruction to non-history majors in other departments as well as the region's secondary education instructors who require continuing education credits for certification.

The department offers both the Master of Arts and Master of Science degrees in the areas of United States history, modern European history, or world history. Candidates with two years of foreign language study at the baccalaureate level or who have passed a standard foreign language examination meet the requirements for the Master of Arts. Students taking either degree may choose either the thesis or comprehensive study option.

The history graduate program provides a rigorous and highly personalized graduate experience. This experience produces confident people with a sense of achievement. They are ready to contribute as scholars and teachers.

Admissions Requirements

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. Students admitted to the program generally score an average of 500 on the verbal and quantitative sections of the GRE's. Students scores on the new analytic writing section should be comparable, i.e. 3.5-4.0. The department requires students whose native language is not English to have a minimum TOEFL score of 600 (paper test) or 247 (computer test).

Ph.D.

The Ph.D. program is jointly conducted by the History Departments of North Dakota State University (Fargo) and the University of North Dakota (Grand Forks). Students should contact the Graduate School on the campus of their choice for application materials.

For more information on this program, please contact at NDSU:

- Dr. Mark Harvey, Professor and Graduate Coordinator
(701) 231-8828
mark.harvey@ndsu.edu
- **At UND:** Dr. Ty Reese, Associate Professor and Graduate Director
(701) 777-2593
ty_reese@und.edu

Admissions Requirements

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, and preference for admission into the Ph.D. program with full graduate standing will be given to applicants who score a combined total of 1,000 points on the verbal and analytical sections of the GRE aptitude test.

The program requires a student for whom English is not a native language to have a minimum TOEFL score of 600.

Residency Requirements

Students enrolled in the Ph.D. program are required to complete at least one academic year (18 credits minimum) in residence at one campus.

Resident students may qualify for teaching assistantships. Students who have completed an M.A. degree may be assigned full responsibility for undergraduate courses or may be assigned to assist a faculty member in teaching courses.

Students will be required to take some courses from faculty at both campuses but will register at only one university. Some courses will be offered by interactive video network; some will be offered through Internet online systems; some courses will require students to travel to the other campus. Students not residing on one of the cooperating campuses will have to have access to a satisfactory research library for various courses and for dissertation research.

Financial Assistance

The graduate department has graduate assistantships for qualified students. Assistantships are 10-20 hours/week with graduate tuition waiver. Students wishing to apply for a teaching assistantship should express this in writing to the chair of the department. The deadline for assistantship applications is April 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, interest and potential in teaching as a career, financial need, and minority status in cases of equally qualified candidates.

The department awards assistantships for a one-year (10 month) contract period. It renews these assistantships for one additional year pending the availability of funds, progress toward the completion of a degree, and satisfactory job performance.

Master's Degree

Thesis Option

A student selecting the thesis option must complete at least 30 semester credits of graduate work with a minimum of 21 credits in history. Most graduate students in history choose this option. The thesis should reflect original thought and research using primary materials. The department recommends that students intending to continue to a Ph.D. program select this option. Students selecting this track must meet the following requirements:

HIST 701	Methods of Historical Research (taken first semester)	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	
HIST 705	Directed Research (taken during second year)	1
History course work at 600 level or above		9-12
Course work in approved outside field, at 600 level or above		6-9

1 written comprehensive exam in student's major area

HIST 798	Master's Thesis	6-10
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Final oral defense

Non-Thesis Option

Comprehensive Study Option

A student choosing the comprehensive study option must complete at least 30 semester credits of graduate work with at least 21 credits in history. The student must present three comprehensive study papers. Students write one comprehensive study paper for their major and each of their minor areas of program study. These papers involve substantial research and synthesis in secondary materials. The department does not expect these papers to be original contributions to the world of scholarship, but rather syntheses that demonstrate mastery of particular topics. Students selecting this track must meet the following requirements:

Lesson Plan Option

This option is designed for graduate students who are teachers at the K-12 level, or who plan to be. The number of credit hours and the course requirements are identical to those of the Comprehensive Plan Option. In the Lesson Plan Option, the student prepares three lesson plans in a parallel fashion to the comprehensive study papers (See Comprehensive Study Option above). In addition to the lesson plan, the student needs to reflect on these teaching units and provide an intellectual and pedagogical context for them. This reflection should demonstrate scholarly thinking and effort.

HIST 701	Methods of Historical Research (taken first semester)	3
9 credits, all of the following (one to be declared the student's major area, the others are minor areas):		
HIST 730	Readings in North American History	3
HIST 760	Readings in European History	3
HIST 780	Readings in World History	3
History course work at 600 level or above		6-9
Course work in approved outside field, at 600 level or above		6-9
1 written comprehensive exam in student's major area		
HIST 797	Master's Paper (2-4 credits)	1-3
3 comprehensive study papers		
1 final oral defense		

Suggested Curricula

First Year

Fall	Credits	Spring	Credits
HIST 701	3	HIST 760	3
HIST 730	3	HIST 780	3
HIST 600 or 700 level history elective		HIST 600 or 700 level history electives	
		HIST 600 or 700 level approved outside field elective	
6		6	

Second Year

Fall	Credits	Spring	Credits
HIST 600 or 700 level history elective		HIST 760 or 780 (both required in comprehensive study option)	3
HIST 600 or 700 level history elective		HIST 797 or 798	1-10
HIST 600 or 700 level approved outside field elective			

HIST 705 (thesis option)	1-4	
	1-4	4-13
Total Credits: 17-29		

Ph.D. Degree

Students must satisfactorily complete 90 credits beyond the bachelor's degree. Students entering with an M.A. degree must complete at least 60 additional semester graduate credits. Core course requirements must be met, which include Methods of Historical Research, Historiography, Seminar in the Teaching of History, at least 2 research seminars, and at least 2 readings courses. Students must complete 36 credits with at least 27 credits in History. Students will earn at least 12 credits in one major field. Students must have at least nine hours each in two minor fields; one minor field must be in History.

Students must have a proficiency in two languages other than their native language, or one foreign language and one special research skill such as statistics or computer science.

The program will require at least one academic year in residence at either campus. Students will register at one of the universities that will be the student's academic "home". The student's adviser must be employed at the home university. At least one member of the student's committee must be employed at the other (not home) university. Students will have to take courses at both universities. Students will write three comprehensive examinations in their major and minor fields. The exams will be read and graded by the supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Students will write a dissertation (up to 24 credits) on an approved topic in consultation with the faculty adviser and the supervisory committee of five faculty. The dissertation must be based on extensive research in primary and secondary sources, must argue an original thesis, and must be defended before the supervisory committee.

The committee will be composed of the faculty adviser who represents the student's field of study and will direct the research and writing of the dissertation. A second member of the committee (second reader) also represents the student's major field of study. A third member of the committee will represent the student's first minor field of study. The fourth member of the committee represents either the student's major field or second minor field. At least one of the four History faculty must be from the cooperating (non-home) university. The Graduate School will appoint the fifth member of the committee.

Major Fields

Students will be required to write three comprehensive exams in their major and minor (or outside) fields. The exams will be read and graded by the student's supervisory committee. Students will complete an oral examination based on the written exams. The oral examination is to be conducted by the supervisory committee.

Major Fields:

- Great Plains History
- Rural History
- North American History
- Western European History

Minor Fields:

- Public History
- World 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

John A. Helgeland, Ph.D.

University of Chicago, 1973

Field: History of Christianity, History of Culture, Roman Empire, Philosophy of History

Thomas D. Isern, Ph.D.

Oklahoma State University, 1977

Field: History and Folklore of the North American Plains, History of Agriculture

Gerritdina Justitz, Ph.D.

University of California--San Diego, 1996

Field: Early Modern Europe, Social and Cultural History of the Reformation

Angela Smith, Ph.D.

Middle Tennessee State University, 2011

Field: Public History, 20th Century American History, Cultural History, Digital History

HDFS-Family Financial Planning

Program and Application Information

Department Head:	Dr. Joel Hektner
Graduate Coordinator:	Dr. Elizabeth Blodgett Salafia
Email:	elizabeth.salafia@ndsu.edu
Department Location:	Evelyn Morrow Lebedeff Hall
Department Phone:	(701) 231-8268
Department Web Site:	www.ndsu.edu/hdfs/academic_programs_admission/graduate/hdfs_graduate_programs
Application Deadline:	One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
Degrees 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 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 and Housing 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.

Admission Requirements

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.

Degree Option

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
HDFS 794	Practicum/Internship	6
3 additional credits from		3
HDFS 767	Professional Practices in Family Financial Planning	
HDFS 768	Housing/Real Estate	
Total Credits		36

Certificate Options

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

Financial and Housing Counseling Option

HDFS 677	Financial Counseling	3
HDFS 764	Family Economics	3
HDFS 768	Housing/Real Estate	3
HDFS 770	Fundamentals of Financial Planning	3
Select 6 credits of the following:		6
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 781		
HDFS 794	Practicum/Internship	
Total Credits		18

Kristen Benson, Ph.D.

Virginia Polytechnic Institute and State University, 2008

Research Interests: Gender Identity and Family/Partner Relationships, Diversity Issues in Family Therapy, Collaborative Approaches to Family Therapy Education and Training, and Qualitative Methodology

Elizabeth Blodgett Salafia, Ph.D.

University of Notre Dame, 2008

Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

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

Thomas 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

James E. Deal, Ph.D.

University of Georgia, 1987

Research Interests: Personality Development in Children; Relationship between individual development and family relationships

Margaret Fitzgerald, Ph.D.

Iowa State University, 1997

Research Interests: Financial Counseling and Planning; Husbands and Wives Who Own and Operate Family Businesses Together; Family Business and Economically Vulnerable/Viable Communities; Gender and Management Issues in Family Business

Heather Fuller-Iglesias, 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

Christie McGeorge, Ph.D.

University of Minnesota, 2005

Research Interests: Heterosexism and Homophobia; Single Parenting; Women's History; Gender Socialization from a Feminist Perspective

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; Interventions For Improving Cognition, Health, And Everyday Functioning

Brandy A. Randall, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Gregory F. Sanders, Ph.D.

University of Georgia, 1983

Research Interests: Later Life Families; Family Strengths

Rebecca Woods, Ph.D.

Texas A&M University, 2006

Research Interests: Perception and Cognition In Infancy; Object Processing; Multimodal Processing; Early Gender Differences

Adjunct

Wendy Troop-Gordon, Ph.D.

University of Illinois, 2002

Research Interests: Peer Relationships in Childhood; Social-cognitive Development; Psycho-social and School Adjustment

Gerontology

Program and Application Information

Department Head:	Dr. Joel Hektner
Graduate Coordinator:	Dr. Elizabeth Blodgett Salafia
Department Location:	Evelyn Morrow Lebedeff Hall
Department Phone:	(701) 231-8268
Department Web Site:	www.ndsu.edu/hdfs/academic_programs_admission/graduate/hdfs_graduate_programs
Application Deadline:	One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
Degrees 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 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 and Housing 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.

Admission Requirements

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.

Degree Option

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 advisor and committee	6
Total Credits	36

Certificate in Gerontology

Required Courses

HDFS 721	Adult Development and Aging	3
HDFS 723	Perspectives in Gerontology	3

Elective Courses- Select 3 from:

ADHM 705	Environment and Aging	3
HNES 652	Nutrition, Health and Aging	3
HDFS 790	Graduate Seminar (*)	3
HDFS 682	Family Dynamics of Aging	3
HDFS 760	Aging Policy	3

Total Credits	15
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* May be taken more than once, as long as the topic areas are different each time.

Kristen Benson, Ph.D.

Virginia Polytechnic Institute and State University, 2008

Research Interests: Gender Identity and Family/Partner Relationships, Diversity Issues in Family Therapy, Collaborative Approaches to Family Therapy Education and Training, and Qualitative Methodology

Elizabeth Blodgett Salafia, Ph.D.

University of Notre Dame, 2008

Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

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

Thomas 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

James E. Deal, Ph.D.

University of Georgia, 1987

Research Interests: Personality Development in Children; Relationship between individual development and family relationships

Margaret Fitzgerald, Ph.D.

Iowa State University, 1997

Research Interests: Financial Counseling and Planning; Husbands and Wives Who Own and Operate Family Businesses Together; Family Business and Economically Vulnerable/Viable Communities; Gender and Management Issues in Family Business

Heather Fuller-Iglesias, 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

Christie McGeorge, Ph.D.

University of Minnesota, 2005

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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; Interventions For Improving Cognition, Health, And Everyday Functioning

Brandy A. Randall, Ph.D.

University of Nebraska-Lincoln, 2002

Research Interests: Relational and Contextual Influences on Adolescents' and Young Adults' Positive and Problem Behaviors

Gregory F. Sanders, Ph.D.

University of Georgia, 1983

Research Interests: Later Life Families; Family Strengths

Rebecca Woods, Ph.D.

Texas A&M University, 2006

Research Interests: Perception and Cognition In Infancy; Object Processing; Multimodal Processing; Early Gender Differences

Adjunct

Wendy Troop-Gordon, Ph.D.

University of Illinois, 2002

Research Interests: Peer Relationships in Childhood; Social-cognitive Development; Psycho-social and School Adjustment

Youth Development

Program and Application Information

Department Head:	Dr. Joel Hektner
Graduate Coordinator:	Dr. Elizabeth Blodgett Salafia
Department Location:	Evelyn Morrow Lebedeff Hall
Department Phone:	(701) 231-8268
Department Web Site:	www.ndsu.edu/hdfs/academic_programs_admission/graduate/hdfs_graduate_programs
Application Deadline:	One month prior to the beginning of each term. Applications accepted for fall, spring, and summer.
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English Proficiency Requirements:	TOEFL iBT 100 (subscores of at least 24 for speaking and 21 for writing); IELTS 7

Program Description

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Admission Requirements

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.

Degree Option

HDFS 710	Foundations of Youth Development	1
HDFS 711	Youth Development	3
HDFS 712	Community Youth Development	3
HDFS 713	Adolescents and Their Families	3
HDFS 714	Contemporary Youth Issues *	3
HDFS 715	Youth in Cultural Contexts	3
HDFS 716	Youth Professionals as Consumers of Research	3
HDFS 717	Program Design, Implementation and Evaluation	3
HDFS 718	Administration and Program Management	3
HDFS 719	Youth Policy	3
HDFS 794	Practicum/Internship	5
3 additional credits to be approved by adviser and committee		3
Total Credits		36

Certificate in Youth Development

HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following		12
HDFS 711	Youth Development	
HDFS 712	Community Youth Development	
HDFS 713	Adolescents and Their Families	
HDFS 714	Contemporary Youth Issues	
HDFS 715	Youth in Cultural Contexts	
HDFS 719	Youth Policy	
Total Credits		13

Certificate in Youth Program Management and Evaluation

HDFS 710	Foundations of Youth Development	1
Select 4 courses from the following:		12
HDFS 714	Contemporary Youth Issues	
HDFS 716	Youth Professionals as Consumers of Research	
HDFS 717	Program Design, Implementation and Evaluation	
HDFS 718	Administration and Program Management	
HDFS 719	Youth Policy	
Total Credits		13

* This course may be taken more than once, as long as the topic areas are different each time.

Research Interests: Gender Identity and Family/Partner Relationships, Diversity Issues in Family Therapy, Collaborative Approaches to Family Therapy Education and Training, and Qualitative Methodology

Elizabeth Blodgett Salafia, Ph.D.

University of Notre Dame, 2008

Research Interests: Family and Peer Influences on Adolescents' Disordered Eating Attitudes and Behaviors

Sean Brotherson, Ph.D.

Oregon State University, 2000

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Thomas Carlson, Ph.D.

Iowa State University, 2000

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Iowa State University, 1997

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Heather Fuller-Iglesias, Ph.D.

University of Michigan, 2009

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Melissa Lunsman O'Connor, Ph.D.

University of South Florida, 2010

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University of Nebraska-Lincoln, 2002

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Gregory F. Sanders, Ph.D.

University of Georgia, 1983

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Texas A&M University, 2006

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Adjunct

Wendy Troop-Gordon, Ph.D.

University of Illinois, 2002

Research Interests: Peer Relationships in Childhood; Social-cognitive Development; Psycho-social and School Adjustment

Industrial and Manufacturing Engineering

Program and Application Information

Interim Department Chair:	Dr. Om Prakash Yadav
Assistant to Chair:	Loralee Carpenter
Department Location:	202 Civil & Industrial Engineering Bldg.
Department Phone:	(701) 231-9818
Department Web Site:	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.
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE-general M.S.310 (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.0 or better; Ph.D. 310 or better (Verbal + Quantitative) and 160 Quantitative minimum and Analytical Writing score of 4.5 or better
English Proficiency Requirements:	TOEFL iBT 81 (Speaking 23; Writing 21) IELTS 6.5 (Writing 5.5; Speaking 5.5)

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 or project option. The project option is available only to candidates who have been professionally employed in industrial engineering, manufacturing engineering or a related field and are working in their field at the time of application for admission to graduate study. The IE&M master's programs is 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/.

Admissions 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.

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 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.

The Master of Science degree in Industrial Engineering and Management or Manufacturing Engineering requires 30 credits of graduate-level study. For the thesis option, of the required minimum 30 credits, at least 21 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (798) must be at least 6, but not more than 10, credits. For the project option, of the required minimum 30 credits, at least 27 credits must be didactic courses numbered 601-689, 691, 700-789, and 791, while the research credits (797) must be at least 3, but not more than 4, credits.

The Doctor of Philosophy degree requires 60 credits beyond the M.S. requirement (90 credits total). Didactic course work must account for at least 27 credits, and of these, 15 credits must be earned in 700-level courses. It is customary for the remainder of the didactic credit requirement to be dedicated directly to the dissertation, either through course preparation, focused research or writing.

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 course of study must be approved by the student's academic adviser, thesis committee, and department chair. Students completing graduate degrees

within the IME Department responsibility 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 complete a preliminary thesis or project proposal within six months of beginning graduate studies, and it is recommended that this be completed during the first semester in residence. The proposal, if approved by the IME Graduate Studies Committee, will provide the direction for the remainder of the student's degree work. At the same time, the student will choose a thesis or project adviser from the IME department faculty. By the end of the first year in residency, the student must have selected a supervisory committee. This committee will be chaired by the faculty adviser and will provide direction, advice and examination of the student's work and achievement.

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

Bashir Khoda, Ph.D.

University at Buffalo, 2012

Research Interests: Bio-Manufacturing, Additive Manufacturing

Val R. Marinov, Ph.D.

Technical University of Sofia, 1992

Research Interests: Advanced Packaging for Flexible Microelectronics

Chrysafis Vogiatzis, Ph.D.

University of Florida, 2014

Research Interests: Applied Operations Research

David L. Wells, Ph.D., C.Mfg.E.

University of Missouri-Rolla, 1996

Research Interests: Product Innovation, Advanced Manufacturing Processes

Om Prakash Yadav, Ph.D.

Wayne State University, 2002

Research Interests: Reliability Engineering, Robust Design

International Agribusiness

Program and Application Information

Department Chair:	Dr. William Nganje
Graduate Coordinator:	Dr. Gregory McKee
Department Location:	500 Barry Hall
Department Phone:	(701) 231-7441
Department Web Site:	www.ag.ndsu.edu/agecon/
Application Deadline:	March 1 to be considered for an assistantship
Degrees Offered:	M.S.
Test Requirement:	GRE (for assistantship consideration)
English Proficiency Requirements:	TOEFL iBT 79 IELTS 6.5

Program Description

Billions of dollars' worth of food and farm products are traded each year on international markets. Food companies scour the globe for customers and suppliers. Policy makers actively promote expanded markets for their country's food producers. Global food and agricultural policies command intense debate in world trade forums. International agribusiness is an exciting and rewarding career.

Entering the world of international agribusiness requires not only a solid educational foundation, but one must also be comfortable with a variety of cultures, have international experience, and demonstrate a desire to learn foreign languages.

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.

The student will participate in an international experience. Three options are available for satisfying the international requirements for the program:

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.
2. 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.
3. 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.

Admissions Requirements

The Department of Agribusiness and Applied Economics 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 submit GRE scores and have adequate preparation in microeconomic theory, calculus, and statistics.

It is desirable that students begin their program in the fall semester, although students may also begin their programs of study in January. Application for admission to graduate school should be as far in advance as possible, in all cases at least one month prior to the next registration date. International students are advised to submit applications no later than March 31 to ensure VISA documents will be completed for a fall matriculation.

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:

Core Courses

AGEC 701	Research Philosophy	1
AGEC 741	Advanced Microeconomics	3
AGEC 744	Agribusiness I: Agricultural Product Marketing and Agribusiness Strategy	3
AGEC 797	Master's Paper	1-10
or AGEC 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	
AGEC 711	Applied Risk Analysis I	
AGEC 712	Applied Risk Analysis II	
Or other approved quantitative coursework		

Approved Electives

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.

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Robert S. Herren, Ph.D.

Duke University, 1975

Research Interests: Economic History, Labor, Money and Banking

Jeremy Jackson, Ph.D.

Washington University in St. Louis, 2008

Research Interests: Microeconomics, Political Economy, Public Finance

Ryan Larsen, Ph.D.

Texas A&M University, 2009

Research Interests: Agricultural Finance, Risk Management

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Gregory McKee, Ph.D.

University of California, Davis, 2006

Research Interests: Industrial Organization, Agribusiness, Cooperatives

Dragan Miljkovic, Ph.D.

University of Illinois, 1996

Research Interests: Agricultural Prices, International Trade, Agricultural and Food Marketing and Policy

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

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

David M. Saxowsky, J.D.

The Ohio State University, 1979

Research Interests: Agricultural Law

Saleem Shaik, Ph.D.

University of Nebraska, 1998

Research Interests: Agriculture Policy and Risk Management, Agriculture Production Economics

Cheryl J. Wachenheim, Ph.D.

Michigan State University, 1994

Research Interests: Agribusiness

Tom Wahl, Ph.D.

Iowa State University, 1989

Research Interests: International Marketing and Trade, Agricultural Trade Policy, Marketing and Price Analysis

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Lei Zhang, Ph.D.

University of Texas at Dallas, 2011

Research Interests: Applied Econometrics, Macroeconomics and Monetary Economics, Regional and Urban Economics

Managerial Logistics

Program and Application Information

Program Director:

Dr. Denver Tolliver

Assistant to the Director of Educational Programs:

Jody Bohn Baldock

Email:

jody.bohn.baldock@ndsu.edu

Department Location:	Upper Great Plains Transportation Institute
Department Phone:	(701) 231-7938
Department Web Site:	www.ndsu.edu/transportation/mml/
Application Deadline:	July 1 for fall semester; December 1 for spring semester
Degrees Offered:	M.M.L.
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

Changing global environments poses great challenges for civilian and military logisticians alike. Response operations require huge amounts of material and personnel delivered in precise quantities and with precise timing. A key to meeting these challenges is a joint interdisciplinary approach to logistics.

The online Master of Managerial Logistics program targets inspiring logisticians, industry professionals, military officers and DOD civilians who want to meet the transportation challenges of the 21st century. A wide range of career opportunities exists in the transportation industry: logistics and supply chain management, operations management, purchasing and demand management, emergency management, consulting, retail and many more.

An advanced degree in logistics will help you stand out above others when you begin your career or advance your career in industry. The Master of Managerial Logistics degree at NDSU will enhance your knowledge, skills, and opportunities for a successful career in transportation. Advance your education and become a leader who sets the industry pace.

Admission Requirements

The Managerial Logistics master's program is open to qualified graduates of universities and colleges of recognized standing. Students must meet the Graduate School admission requirements.

The Master of Managerial Logistics degree is an online degree and does not require a thesis. A minimum of 35 credits is required for the Master of Managerial Logistics. All 35 credits must be completed using approved courses numbered from 700-789, and 790. Students will participate in a capstone experience, culminating all course material, applications, and research skills together in the Case Studies in Logistics course. An overall GPA of 3.0 or higher must be maintained.

The MML is an interdisciplinary program. Master of Managerial Logistics courses consist of the following:

TL 711	Logistics Systems	4
TL 715	Enterprise Resource Planning	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 725	Technology Advances and Logistics	3
TL 727	Organizational Change Management	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 733	Case Studies in Logistics	3
TL 751	Transportation Systems Security	3

Sample plan of study (Note: Plan of study can be adjusted if transfer credit are accepted.)

First Year					
Fall	Credits	Spring	Credits	Summer	Credits
TL 711	4	TL 719	3	TL 729	3
TL 751	3	TL 723	3	TL 731	3
	7		6		6
Second Year					
Fall	Credits	Spring	Credits	Summer	Credits
TL 725	3	TL 715	3	TL 727	3

File Plan of Study	TL 721	4 TL 733	3
	3	7	6

Total Credits: 35**Canan Bilen-Green, Ph.D.**

University of Wyoming, 1998

Research Interests: Quality and Reliability Engineering, Design and Auditing of Quality and Productivity Monitoring Systems, Statistical Modeling and Applications, Applied Operations Research

Department: Industrial and Manufacturing Engineering

John Bitzan, Ph.D.

University of Wisconsin-Milwaukee, 1997

Research Interests: Transportation Economics

Department: Management and Marketing

Alan Dybing, Ph.D.

North Dakota State University, 2013

Research Interests: Asset Management, Energy Impacts, Freight Transportation, Agricultural Transportation, Supply Chain Management, Transportation Economics, Spatial Analysis, Transportation Systems Modeling

Department: Upper Great Plains Transportation Institute

Gokhan Egilmez, Ph.D.

Ohio University, 2012

Research Interests: Problems of Multidisciplinary Domains Including Manufacturing, Supply Chains, Energy, Food & Agriculture, Transportation and Built Environment From Triple Bottom Line (Socio Economic And Environmental) Sustainability Point of View by Using Novel Research Methods Such as Life Cycle Assessment (LCA), Regional, National and Multi Region Input Output Analysis (RIO, NIOA, And MRIO), Data Envelopment Analysis (DEA), System Dynamics (SD), Carbon, Energy, Water and Ecological Footprint Analysis, Multi-Criteria Decision Making, Goal Programming and Fuzzy Set Theory

Department: Industrial and Manufacturing Engineering

Kambiz Farahmand, PhD, PE

University of Texas at Arlington, 1992

Research Interests: Productivity Improvement of Manufacturing Systems, Lean Manufacturing and implementation, Ergonomics, Safety and Human Factors Engineering, Human Exposure and Physiology Simulation, Simulation and Modeling, Facilities and Production Layout Planning, Operations & Materials Logistics Management and Strategic Planning, ISO and QS 9000 standards, and Healthcare Management

Department: Industrial and Manufacturing Engineering

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Department: Agribusiness and Applied Economics

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Department: Agribusiness and Applied Economics

Jill Hough, Ph.D.

University of California-Davis, 2007

Research Interests: Public Transportation, Travel Behavior, Built Environment, Accessibility and Mobility of Seniors

Department: Upper Great Plains Transportation Institute

Ying Huang, Ph.D.

North Dakota State University, 2015

Research Interests: Intelligent Transportation Systems, Pavement and Pipeline Performance Evaluation, Vehicle Identification and Traffic Analysis, Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Applications of Adaptive and Smart Materials, Multi-Hazard Assessment and Mitigation

Department: Civil and Environmental Engineering

Daniel J. Klenow, Ph.D.

North Dakota State University

Research Interests: Social Vulnerability and Functional Needs Populations, Homeland Security and Terrorism, Tornado Vulnerability, Disaster Preparedness, Response, and Recovery

Department: Emergency Management

Won Koo, Ph.D.

Iowa State University, 1974

Research Interests: International Trade

Brenda Lantz, Ph.D.

Pennsylvania State University, 2006

Research Interests: Commercial Vehicle Safety Systems and Analysis, Supply Chain, Intelligent Transportation Systems for Commercial Vehicle Operations, and Statistical Modeling and Diagnostics.

Department: Upper Great Plains Transportation Institute

EunSu Lee, Ph.D.

North Dakota State University, 2011

Research Interests: Transportation Systems Modeling, Informatics, Spatial Analysis, Logistics, Supply Chain Management, Industrial Engineering

Department: Upper Great Plains Transportation Institute

Pan Lu, Ph.D.

North Dakota State University, 2011

Research Interests: Asset Management, Freight Transportation, Statistical Modeling and Applications, Multi-Modal Transportation, Applied Operation Research

Department: Upper Great Plains Transportation Institute

Diomo Motuba, Ph.D.

North Dakota State University, 2009

Research Interests: Transportation Economics, Transportation Systems Modeling, Freight Transportation, Econometrics, Logistics, Supply Chain Management

Department: Upper Great Plains Transportation Institute

Kendall E. Nygard, Ph.D.

Virginia Polytechnic Institute, 1978

Research Interests: Advanced Technologies in Logistics, Optimization Modeling, Simulation Modeling, Data Science and Computational Methods

Department: Computer Science and Operations Research

Peter O'Dour, Ph.D.

University of Missouri-Rolla, 2004

Research Interests: GIS, Groundwater contamination, Remote sensing

Department: Geosciences

David C. Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Impacts of Agricultural Production Methods on the Environment and Natural Resources, Economics of Precision Agriculture Technologies and the Response of Cropping Patterns, Land Use Change to Emerging Biofuels Policy at the Federal Level

Department: Agribusiness and Applied Economics

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Complex Systems and Flexible Manufacturing and Using Linear and Nonlinear Dynamic and Integer Programming and Network Flows

Department: Management and Marketing

Denver D. Tolliver, Ph.D.

Virginia Polytechnic University, 1989

Research Interests: Transportation Systems Planning, Freight Transportation, Economic Analysis

Department: Upper Great Plains Transportation Institute

Rodney D. Traub, Ph.D.

Purdue University, 1994

Field: Operations Management

Department: Management and Marketing

Kim Vachal, Ph.D.

George Mason University, 2005

Research Interests: Policy, Economics, Regional Development

Department: Upper Great Plains Transportation Institute

Amiy Varma, Ph.D.

Purdue University, 1993

Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management

Department: Civil Engineering

David L. Wells, Ph.D.

University of Missouri-Rolla, 1996

Research Interests: International Studies in Manufacturing Technology, Strategic Management, Economic Development Strategies

Department: Industrial and Manufacturing Engineering

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Department: Agribusiness and Applied Economics

Frank Yazdani, Ph.D., PE

University of New Mexico, 1987

Research Interests: Structural Engineering/Mechanics, Constitutive Modeling of Materials, Damage Mechanics, Plasticity, Computational Plasticity, Finite Elements, Concrete and Masonry Materials

Department: Civil Engineering

Mass Communication

Program and Application Information

Department Chair:

Dr. Mark Meister

Graduate Coordinator:

Dr. Stephenson Beck

Department Location:

Minard Hall 338

Department Phone:

(701) 231-7705

Department Web Site:

www.ndsu.edu/communication/

Application Deadline:

Ph.D - March 1; M.S. and M.A. - no deadline;

Degrees Offered:

Ph.D., M.A., M.S.

Test Requirement:

GRE (general required; subject recommended)

English Proficiency Requirements:

TOEFL iBT 100, IELTS 7 for admission; TOEFL iBT 100, IELTS 7 for teaching assistantship

Program Description

The graduate program in communication offers graduate study leading to the M.A., M.S., 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. In addition, the M.A. and M.S. degrees are available through online delivery. Information also is available on the department's Web site, www.ndsu.edu/communication.

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Science or 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; conference paper; final course paper
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) may 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 may apply for teaching assistantships at the master's or doctoral degree level. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program. The teaching assistantship deadline is March 1 for the following fall semester.

Graduate assistants receive a stipend and tuition waiver. Applications are available from the department office or online from the department's web site (<https://www.ndsu.edu/communication>). (<http://www.ndsu.edu/communication>)

Master's program

The Master of Arts program is designed for students who are interested in conducting qualitative or rhetorical research, while the Master of Science program is designed for those interested in quantitative research. Both programs require 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

Teaching assistants are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.

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	

Students pursuing the M.A. degree must take at least one qualitative methods course (COMM 704, COMM 708, COMM 767, or SOC 700).

Students pursuing the M.S. degree must complete at least one quantitative methods course (COMM 707, COMM 710, SOC 701, or STAT 725).

Elective Specialization

12-15 credits of additional coursework, depending on whether the thesis or paper/project 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 Paper/Project

The paper/project option requires three credits of COMM 797. The thesis requires six credits of COMM 793. 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 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 Scholars courses.

Course Requirements

Minimum of 30 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 701	Advanced Research Methods in Communication I	3
COMM 711	Communication Theory	3
COMM 735 or 783	Media and Society or Org Comm Theory Course	3
Teaching assistants, without adequate prior teaching experience, are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.		
Content Concentration		
Minimum of 15 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 Courses		
Exclusive of COMM 701, maximum of 6 credit hours of independent study		6
Dissertation		
Dissertation		15

Comprehensive Exam

When coursework is nearly completed, the DGS 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

Ann Burnett, Ph.D.

University of Utah, 1986

Research Interests: Legal Communication, Small Group Communication, Interpersonal Communication, Gender and Communication

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

Robert S. Littlefield, Ph.D.

University of Minnesota, 1983

Research Interests: Intercultural Communication, Risk and Crisis Communication, Forensic History and Pedagogy

Pamela Lutgen-Sandvik, Ph.D.

Arizona State University, 2005

Research interests: workplace bullying, organizational communication

Zoltan Majdik, Ph.D.

University of Southern California, 2008

Research Interests: Science and Risk Communication in Biotechnological Practice, Rhetorical and Argumentation Theory, Ethics and Moral Theory

Mark Meister, Ph.D.

University of Nebraska, 1997

Research Interests: Rhetorical and Critical Theory, Environmental Communication

Amy O'Connor, Ph.D.

Purdue University, 2004

Research Interests: Organizational Communication, Corporate Advocacy, Public Affairs and Issues Management

Charles Okigbo, Ph.D.

Southern Illinois University, 1982

Research Interests: Social and Behavioral Change Communication, Health Communication

Carrie Anne Platt, Ph.D.

University of Southern California, 2008

Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

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

Nan Yu, Ph.D.

Pennsylvania State University, 2009

Research Interests: Health Communication, International Communication

Emeritus

Paul E. Nelson, Ph.D.

University of Minnesota

Judy C. Pearson, Ph.D.

Indiana University

Master of Athletic Training (MATrg.)

Program and Application Information

Department Head:	Dr. Margaret Fitzgerald
Program Coordinator:	Dr. Nikki German Knodel
Department Location:	Bentson Bunker Fieldhouse
Department Phone:	(701) 231-8093
Department Web Site:	www.ndsu.edu/hnes/athletic_training_professional/
Application Deadline:	February 1 for summer admission
Degrees Offered:	MATrg
English Proficiency Requirements:	TOEFL iBT 81; IELTS 6.5

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 (41 credits) 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. This is a five-semester program starting in the second eight-week session of 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 total.

- During the junior status of the Exercise Science undergraduate program at NDSU, students apply and must be admitted into the NDSU Graduate School.
- Students start the MATrg program in July, and take both undergraduate and graduate courses during the fall and spring semesters of their fourth year.
- After meeting all degree requirements and completing the exercise science internship in the summer after their fourth year, students will be awarded a Bachelor of Science in Exercise Science.

- At end of the fifth year, the student will graduate with a Master of Athletic Training (MATrg).
- This program is recommended for entering freshmen, student-athletes, and transfer students who want to pursue an athletic training degree at NDSU.

Option 2: Two year program. This option is for students who have earned a bachelor's degree in Exercise Science or a related field from another institution.

- Students must meet the admission requirement and be admitted into the NDSU Graduate School.
- The program begins in July.

Admission Requirements (same for both options):

- Acceptance into the NDSU Graduate School
- Undergraduate overall GPA of 3.0 on a 4.0 scale
- Research Writing: Students are required to write a research-based position paper making an evidence-based argument for the use of prophylactic tape or bracing. A minimum of two (2) references must be included.
- Documentation of 50 hours of observation completed under the direct supervision of a BOC ATC® in an athletic training room setting. All 50 hours must be completed within one (1) calendar year of application.
- Minimum of "C" or higher in the following college courses:
 - Human Anatomy and Lab (1 semester)
 - Human Physiology and Lab (1 semester)
 - General Physics and Lab (1 semester)
 - General Chemistry and Lab (1 semester)
 - Exercise Physiology and Lab (1 semester)
 - Kinesiology/Biomechanics and Lab (1 semester)
 - Medical Terminology (1 semester)
 - Nutrition (1 semester)

After successful completion of this program (41 credits), the student will be eligible to take the Board of Certification, Inc. (BOC) exam. Certification by the BOC is the entry-level credential. See the **MATrg website** for all necessary information regarding the application process.

Summer I		
HNES 780	Athletic Training Techniques	3
Fall I		
HNES 775	Therapeutic Modalities	3
HNES 781	Orthopedic Assessment I	5
HNES 783	Athletic Training Clinical Education I	2
Spring I		
HNES 770	Evidence Based Research and Practice	2
HNES 782	Orthopedic Assessment II	5
HNES 784	Athletic Training Clinical Education II	2
Summer II		
HNES 794	Practicum/Internship	1
Fall II		
HNES 774	Therapeutic Exercise	3
HNES 776	Non-Orthopedic Assessment	3
HNES 785	Athletic Training Clinical Education III	2
HNES 793	Individual Study	1
*Elective 600/700 level course		
Spring II		
HNES 778	Athletic Training Administration and Professional Development	3
HNES 789	Athletic Training Clinical Education IV	3
HNES 793	Individual Study	1
*Elective 600/700 level course		
Total Credits		39

* Only one (1) Elective is needed during the second year. The Elective must be approved by the student's adviser and/or Program Director.

Shannon David, Ph.D., ATC

Ohio University, 2013

Research Interests: Quantification of Intervention Outcomes, Patient- Clinician Relationship

Kara Gange, Ph.D., ATC

North Dakota State University, 2010

Research Interests: Therapeutic Modalities and Diagnostic Ultrasound

Nicole German Knodel, Ph.D., ATC

North Dakota State University, 2008

Research Interests: Critical Thinking, Clinical Practice

Katie Lyman, Ph.D., ATC

University of South Florida, 2014

Research Interests: Kinesio Tape®, Manual Medicine, Emergency Medicine

Materials and Nanotechnology

Program and Application Information

Director:

Erik Hobbie

Email:

Erik.Hobbie@ndsu.edu

Department Phone:

(701) 231-6103

Department Web Site:

www.ndsu.edu/materials_nanotechnology/

Application Deadline:

International applications are due May 1st for fall and August 1 for spring and summer. Domestic applicants should apply at least one month prior to the start of classes.

Degrees 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.

Admissions Requirements

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. 810).

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

Graduate students in Materials & Nanotechnology are able to obtain a master's degree following one of two different tracks. In each case, a total of at least 30 graduate credits with a grade point average of 3.0 or better are required.

The non-thesis option (Masters of Materials and Nanotechnology – Plan B) 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 is the equivalent of a Plan B Master's with a 6-10 credit culminating experience (794) replacing the research credits (798). The thesis option (Plan A) represents a more traditional Masters of Science in Materials and Nanotechnology, 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 credits.

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.

Courses Offered

All students must complete the core curriculum which consists of:

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

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	Electrochemistry	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

Program and Application Information**Department Chair:**

Dr. Benton Duncan

Graduate Coordinator:

Dr. Indranil Sengupta

Department Location:

412 Minard

Department Phone:

(701) 231-8171

Department Web Site:

math.ndsu.nodak.edu/ (<http://math.ndsu.nodak.edu>)

Application Deadline:

March 1 to be considered for assistantships for fall. Openings may be very limited for spring.

Degrees 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, 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.

Admissions Requirements

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. 810), 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 two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated proficiency in a computer programming language.
4. 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 credits 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 two of the four written preliminary examinations offered by the department. These examinations are offered in four areas: Algebra, Analysis, Applied Mathematics, and Geometry/Topology.
3. Demonstrated reading proficiency of mathematical writing in French, German, or Russian. A student's supervisory committee may require a second foreign language.
4. Demonstrated proficiency in a computer programming language.
5. A passing grade in a preliminary oral examination administered by the student's supervisory committee after completion of the Preliminary Examinations.
6. 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.
7. A dissertation video describing the candidate's research, evaluated by the candidate's supervisory committee.

Timelines

Ph.D. students have 3 years from first enrolling in a 700 level Mathematics course as a graduate student to complete the written Preliminary Examination requirement.

A student advances to candidacy after completion of the preliminary oral examination. All students must advance to candidacy no later than the start of their fourth year in the graduate program of the Department of Mathematics. 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

Abraham Ayabo, Ph.D.

University of Nevada, Reno, 2010

Research Interests: Mathematics Education

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

Leo Butler, Ph.D.

Queen's University, 2000

Research Interests: Hamiltonian Mechanics and Geometry

Catalin Ciuperca, Ph.D.

University of Kansas, 2001

Research Interests: Commutative Algebras, Algebraic Geometry

Michael Cohen, Ph.D.

University of North Texas, 2013

Research Interests: Groups, Dynamics Descriptive Set Theory

Dogan Comez, Ph.D.

University of Toronto, 1983

Research Interest: Ergodic Theory, Measureable Dynamics, Operator Theory

Susan Cooper, Ph.D.

Queen's University, 2005

Research Interests: Commutative Algebra and Algebraic Geometry

Davis Cope, Ph.D.

Vanderbilt University, 1980

Research Interests: Partial Differential Equations, Numerical Methods, Applied Mathematics

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, K-theory

Friedrich Littmann, Ph.D.

University of Illinois, Urbana, 2003

Research Interests: Approximation theory, Number theory

William Martin, Ph.D.

University of Wisconsin, 1993

Research Interests: Mathematics Education

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 Mathematical Physics

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

Mechanical Engineering

Program and Application Information

Department Chair:

Dr. Alan Kallmeyer

Graduate Coordinator:

Dr. Ghodrat Karami

Department Location:

111 Dolve Hall

Department Phone:

(701) 231-8671

Department Email:

ndsu.me.gradprogram@ndsu.edu

Department Web Site:	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.
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE (International applicants). Minimum required total (quantitative + verbal): 300; Minimum required quantitative: 155
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 engineering mechanics, fatigue and fracture, biomechanics and biomaterials, thermal engineering, 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 studies and earn an M.S. degree in Mechanical Engineering.

Admissions Requirements

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 (and 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 a core curriculum of 9 credits (three courses) of graduate courses in mechanical engineering, a master's thesis of 6 to 9 credits of ME 798 Master's Thesis, and the remaining credits from other approved graduate level courses. 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 a core curriculum of 9 credits (three courses) of graduate courses in mechanical engineering, a master's paper of no more than 3 credits of ME 797 Master's Paper, and the remaining credits from other approved graduate level courses. 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. Each student is required to pass a series of written qualifying exams on core subjects within 24 months of enrollment in the Ph.D. program. After the majority of course work has been completed, 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, but which 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.

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

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

Dilpreet S. Bajwa, Ph.D.

University of Illinois at Urbana-Champaign, 2000

Research Interests: Biobased Polymer Composites, Wood Composites, Processing and Characterization, Recycled Materials, Utilization, Durability Engineering via Weathering and Degradation Mechanisms

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

Michael Stewart, Ph.D.

University of Illinois, 1979

Research Interests: Computational Fluid Dynamics, Heat and Mass Transfer in Porous Media

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

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

Mariusz Ziejewski, Ph.D.

North Dakota State University, 1986

Research Interests: Impact Biomechanics, Human Body Dynamics, Head and Neck Trauma, Impact Trauma, Human Brain Modeling, Statistical Methods

Merchandising

Program and Application Information

Department Head:	Dr. Holly Bastow-Shoop
Graduate Coordinator:	Dr. Linda Manikowske
Email:	Linda.Manikowske@ndsu.edu
Department Location:	Evelyn Morrow Lebedeff Hall, EML 178
Department Phone:	(701) 231-7352
Department Web Site:	www.ndsu.edu/dce/degrees/graduate/ms_merch
Application Deadline:	Applicants should apply at least two months prior to the start of classes each semester.
Degrees Offered:	M.S., Certificate
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

The Department of Apparel, 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. This program provides students with a global perspective of the interaction of cultural, economic, political, social, and environmental systems as they relate to the industry. In the ever-changing global environment, the ability to merchandise products to the consumer is a strategic advantage, and will distinguish graduates of this program from their peers in the industry. The fully online program allows students to complete course work while maintaining their professional lives.

Admissions Requirements

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.

In completing the application, you are asked to write a statement (500 words or less) identifying and discussing your reasons for applying to this program. Within this statement you are to discuss how learning about diverse perspectives, critical thinking, and effective leadership will enhance your understanding of merchandising.

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's Degree Requirements

The 36-credit master's degree program consists of ten required 3-credit courses, listed below, as well as a 6-credit comprehensive project required by North Dakota State University. **Course descriptions and tentative schedules are available at** <http://www.ndsu.edu/adhm/merchandising/about.html>

Courses are as follows:

ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3

ADHM 730	Product Design, Deveopment and Evaluation	3
ADHM 740	Promotional Strategies in Merchandising	3
ADHM 750	Retail Theory and Current Practice	3
ADHM 760	Historical and Contemporary Issues in Trade	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 or ADHM 798 or Electives	Comprehensive Project	6
Total Credits		36

Graduate Certificate Requirements

The 12 credit graduate certificate program consists of three required 3-credit courses and one elective 3-credit course, listed below.

• ADHM 710	Consumer Behavior in Merchandising	3
ADHM 720	Professional Advancement	3
ADHM 730 or ADHM 740	Product Design, Deveopment and Evaluation Promotional Strategies in Merchandising	3
ADHM 750	Retail Theory and Current Practice	3
Total Credits		12

Holly E. Bastow-Shoop, Ph.D.

Oklahoma State University, 1981

Research Interests: Global Retailing and Expansion

Ann W. Braaten, Ph.D.

University of Minnesota, 2005

Research Interests: Historical Apparel/Textiles, Clothing Design, Product Development, Women-Based Business

Jaeha Lee, Ph.D.

University of Minnesota, 2008

Research Interests: Consumer Behavior, Social Responsibility

Linda Manikowske, Ph.D.

Iowa State University, 1993

Research Interests: Retail Merchandising, Consumer Behavior, Experiential Education

Microbiology

Program and Application Information

Department Head:	Dr. Neil Dyer
Graduate Coordinator:	Dr. John McEvoy
Department Location:	Van Es Hall
Department Phone:	(701) 231-7667
Application Deadline:	February 15 for fall semester
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE
English Proficiency Requirements:	TOEFL ibT 71; IELTS 6

Program Description

The Department of Veterinary and Microbiological Sciences offers graduate study leading to an M.S. in Microbiology and a Ph.D. in Molecular Pathogenesis. Faculty in the department have expertise in medical microbiology, ecology, genomics, virology, immunology, parasitology, microbial

physiology, and food safety. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Molecular Pathogenesis integrates microbial genetics, mechanisms of pathogen-host interaction, and immunology to better understand the molecular basis of disease.

Admissions Requirements

In addition to the Graduate School requirements (p. 810), 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.

M.S. in Microbiology

A Master's degree in Microbiology at NDSU emphasizes research methodology and laboratory techniques. Student research and academic programs 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 shall 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 are encouraged to visit with each faculty member and spend time in each laboratory to acquaint themselves with the department's research programs.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis encompasses the study of molecular pathogenesis of infectious and non-infectious diseases with an emphasis on zoonotic diseases and public health. The comprehensive doctoral degree in Molecular Pathogenesis integrates the study of microbial genetics, mechanisms of pathogen-host interaction, and cellular immunology to better understand the molecular basis of disease. Doctoral candidates in Molecular Pathogenesis focus on research and utilize the expertise of one or more departmental faculty members. Course work is designed to be relevant to future careers in academia, industry, and government.

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 with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the required minimum 30 semester credits. The M.S. 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.

Ph.D. in Molecular Pathogenesis

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. Of these, no less than 27 credits must be in courses other than seminar or research credits, and must include 15 credits at the 700-789 level. An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on course requirements for this program.

Examinations

Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first, which is generally taken at the end of the first year in residence, 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.

Dissertation Research

In addition to the defense of the written dissertation in the final oral examination, the candidate will present a public seminar based on the dissertation research. At least one academic semester, and preferably two semesters, shall elapse between the preliminary examinations and the oral defense of the research-based dissertation.

Peter Bergholz, Ph.D.

Michigan State University, 2007

Research Interests: Environmental Microbiology

Teresa Bergholz, Ph.D.

Michigan State University, 2007

Research Interests: Foodborne Pathogenesis

Eugene S. Berry, Ph.D.

Northeastern University, 1983

Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.

Virginia Commonwealth University, 1998

Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.

Iowa State University, 1991

Research Interests: Studies with Bacillus Anthracis, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Nathan A. Fisher, Ph.D.

University of Michigan, 2006

Research Interests: Infectious Disease and Public Health

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: Pathogenicity and Virulence of Cryptosporidium

Birgit Pruess, Ph.D.

Ruhr-Universität Bochum, 1991

Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.

Virginia Tech, 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

Molecular Pathogenesis

Program and Application Information

Department Head:	Dr. Neil Dyer
Graduate Coordinator:	Dr. John McEvoy
Department Location:	Van Es Hall
Department Phone:	(701) 231-7667
Department Web Site:	http://www.ndsu.edu/vetandmicro/
Application Deadline:	February 15 for fall
Degrees Offered:	Ph.D., M.S.
Test Requirement:	GRE
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

The Department of Veterinary and Microbiological Sciences offers graduate study leading to an M.S. in Microbiology and a Ph.D. in Molecular Pathogenesis. Faculty in the department have expertise in medical microbiology, ecology, genomics, virology, immunology, parasitology, microbial physiology, and food safety. The M.S. in Microbiology emphasizes research methodology and laboratory techniques. The Ph.D. in Molecular Pathogenesis integrates microbial genetics, mechanisms of pathogen-host interaction, and immunology to better understand the molecular basis of disease.

Admissions Requirements

In addition to the Graduate School requirements (p. 810), applicants must have evidence of a strong academic record in the biological sciences. The following science courses are required or recommended:

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- 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.

M.S. in Microbiology

A Master's degree in Microbiology at NDSU emphasizes research methodology and laboratory techniques. Student research and academic programs 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 shall 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 are encouraged to visit with each faculty member and spend time in each laboratory to acquaint themselves with the department's research programs.

Ph.D. in Molecular Pathogenesis

The Ph.D. in Molecular Pathogenesis encompasses the study of molecular pathogenesis of infectious and non-infectious diseases with an emphasis on zoonotic diseases and public health. The comprehensive doctoral degree in Molecular Pathogenesis integrates the study of microbial genetics, mechanisms of pathogen-host interaction, and cellular immunology to better understand the molecular basis of disease. Doctoral candidates in Molecular Pathogenesis focus on research and utilize the expertise of one or more departmental faculty members. Course work is designed to be relevant to future careers in academia, industry, and government.

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 with inadequate undergraduate training in microbiology will be required to complete undergraduate courses in microbiology in addition to the required minimum 30 semester credits. The M.S. 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.

Ph.D. in Molecular Pathogenesis

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. Of these, no less than 27 credits must be in courses other than seminar or research credits, and must include 15 credits at the 700-789 level. An overall GPA of 3.0 or higher must be maintained. Please refer to the department website for more information on course requirements for this program.

Examinations

Two preliminary examinations must be completed successfully before advancement to candidacy for the doctoral degree. The first, which is generally taken at the end of the first year in residence, 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.

Dissertation Research

In addition to the defense of the written dissertation in the final oral examination, the candidate will present a public seminar based on the dissertation research. At least one academic semester, and preferably two semesters, shall elapse between the preliminary examinations and the oral defense of the research-based dissertation.

Peter Bergholz, Ph.D.

Michigan State University, 2007

Research Interests: Environmental Microbiology

Teresa Bergholz, Ph.D.

Michigan State University, 2007

Research Interests: Foodborne Pathogenesis

Eugene S. Berry, Ph.D.

Northeastern University, 1983

Research Interests: Animal Virology, Molecular Pathogenesis of ss(+) RNA Viruses

Glenn Dorsam, Ph.D.

Virginia Commonwealth University, 1998

Research Interests: Molecular Pathogenesis

Neil W. Dyer, D.V.M., M.S.

Iowa State University, 1991

Research Interests: Studies with Bacillus Anthracis, Porcine Pneumonia, New Malignant Catarrhal Fever Herpesvirus

Nathan A. Fisher, Ph.D.

University of Michigan, 2006

Research Interests: Infectious Disease and Public Health

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: Pathogenicity and Virulence of Cryptosporidium

Birgit Pruess, Ph.D.

Ruhr-Universität Bochum, 1991

Research Interests: Global Gene Regulation in Enteric Bacteria, Complex Regulatory Networks

Sheela Ramamoorthy, Ph.D.

Virginia Tech, 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-D.M.A.

Program and Application Information**Department Chair:**

Dr. John Miller

Graduate Music Coordinator:

Dr. Jo Ann Miller

Department Location:

115 Music Education Building

Department Phone:

(701) 231-7932

Department Web Site:www.ndsu.edu/performingarts/music/graduate/index.html**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.

Degrees Offered:

D.M.A., M.M.

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Graduate Degrees

Graduate degrees (the Master of Music and the Doctor of Musical Arts) are offered in performance, conducting and music education.

The 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. 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 advisors 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 advisor, 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 advisor. 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.

Doctor of Musical Arts in Vocal Performance

MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)	
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 Music History	
MUSC 742	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

MUSC 709	Graduate Ensemble (1,1,1,1,1,1,1,1,1,1)
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MUSC 731	Applied Study (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 Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Pedagogy/Literature (Minimum six credits in each)		15
MUSC 722	Applied Instrumental Pedagogy	
MUSC 764	Applied Instrumental Literature	
Electives (in consultation with adviser)		9
Total Credits		90

Doctoral of Musical Arts in Piano Performance

MUSC 709	Graduate Ensemble (1,1,1,1) *	
MUSC 731	Applied Study (4,4,4,4,4)	
MUSC 732	Applied Collaborative Study (2,2)	
MUSC 748	Music Bibliography/Research Methods	
MUSC 780	Recital (4,4,4)	
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 Music History	
MUSC 742	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

Pending approval by the National Association of Schools of Music in November, 2015.

FREN 101	First-Year French I **	
or FREN 102	First-Year French II	
or FREN 201	Second-Year French I	
or FREN 202	Second-Year French II	
GERM 101	First-Year German I **	
or GERM 102	First-Year German II	
or GERM 201	Second-Year German I	
or GERM 202	Second-Year German II	
MUSC 731	Applied Study (2,2,2,2)	
MUSC 732	Applied Collaborative Study (4,4,4,4)	
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		50
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 Music History	
MUSC 742	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 **		12-15
MUSC 642	Opera Literature	
MUSC 705	Graduate Diction Survey	
MUSC 709	Graduate Ensemble	
MUSC 725	English and German Diction	
MUSC 726	Italian and French Diction	
MUSC 727		
MUSC 728		
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

* At least one course must be taken from MUSC 611-734; at least one course must be taken from MUSC 740-744.

** Credits earned in undergraduate language courses will not count toward degree totals.

Doctor of Musical Art in Conducting

MUSC 709	Graduate Ensemble (1,1,1,1,1,1)	
MUSC 731	Applied Study (4,4,4,4,4)	
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 Music History	
MUSC 742	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	
Cognate Courses determined with advisor from Conducting, Music Education, Academic Studies and Performance		14
Electives (in consultation with advisor)		12
Total Credits		90-96
Jeremy Brekke, D.A., Associate Professor		
Andrew Froelich, D.M.A., Professor		
Robert W. Groves, Ph.D., Professor		
Sigurd Johnson, D.M.A., Associate Professor		
Robert J. Jones, D.M.A., Associate Professor		
Cassie Keogh, D.M.A., Assistant Professor		
Kyle Mack, D.A., Associate Professor		
Jo Ann Miller, D.M.A., Professor		
John Miller, Ph.D., Professor		
Charlette Moe, D.M.A., Assistant Professor		
Katherine Noone, D.M.A., Assistant Professor		
Warren Olfert, Ph.D., Associate Professor		
Matthew Patnode, D.M.A., Associate Professor		
Virginia Sublett, D.M.A., Professor		
Michael Weber, D.M.A., Professor		

Music-Master's

Program and Application Information

Department Chair:	Dr. John Miller
Graduate Music Coordinator:	Dr. Jo Ann Miller
Department Location:	115 Music Education Building
Department Phone:	(701) 231-7932
Department Web Site:	www.ndsu.edu/performingarts/music/graduate/index.html
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.
Degrees Offered:	M.M., D.M.A.
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Graduate Degrees

Graduate degrees (the Master of Music and the Doctor of Musical Arts) are offered in performance, conducting and music education.

The 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.

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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 advisor, 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 advisor. 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.

Master of Music in Music Education Degree

Music Education Core		9
MUSC 701	Psychology Of Music	
MUSC 703	Foundations of Music Education	
MUSC 790	Graduate Seminar	
Music Core		10
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 765	Band Literature:History and Development	
MUSC 766	Band Literature:Chamber Music,Other Genres	
Other Music History, Theory, Literature or Pedagogy (to be determined with adviser)		9
MUSC 794	Practicum	4

Master of Music in Instrumental Performance

MUSC 709	Graduate Ensemble	1
MUSC 722	Applied Instrumental Pedagogy	1-3
MUSC 731	Applied Study	1-4
MUSC 748	Music Bibliography/Research Methods	2
MUSC 764	Applied Instrumental Literature	1-3
MUSC 780	Recital	2-4
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 Music History	
MUSC 742	Classical 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 Piano Performance

MUSC 709	Graduate Ensemble	1
MUSC 722	Applied Instrumental Pedagogy	1-3
MUSC 748	Music Bibliography/Research Methods	2
MUSC 780	Recital	2-4

One course to be taken from each of the following areas:

Literature		
MUSC 643	Keyboard Literature	
MUSC 770	Topics in Keyboard Literature	
Pedagogy		
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 741	Baroque Music History	
MUSC 742	Classical 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

Pending approval by the National Association of Schools of Music in November, 2015.

MUSC 705	Graduate Diction Survey	3
MUSC 731	Applied Study	1-4
MUSC 732	Applied Collaborative Study	1-4
MUSC 748	Music Bibliography/Research Methods	2
MUSC 750	Studies in Collaborative Piano	2
MUSC 764	Applied Instrumental Literature	1-3
MUSC 780	Recital (2,2)	2-4

One course to be taken from each of the following areas:

Theory		
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 Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Total Credits		31

Master of Music in Vocal Performance

MUSC 709	Graduate Ensemble	1
MUSC 721	Advanced Vocal Pedagogy	3
MUSC 731	Applied Study	1-4

MUSC 748	Music Bibliography/Research Methods	2
MUSC 780	Recital (2,2)	2-4
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 Music History	
MUSC 742	Classical Music History	
MUSC 743	Romantic Music History	
MUSC 744	20th Century Music History	
Literature		
MUSC 767	Vocal Literature I-Baroque/Classical	3
MUSC 768	Vocal Literature II-Romantic	3
MUSC 769	Vocal Literature III-20Th Century/Contemporary	3
Electives (in consultation with adviser)		
Minimum Total Credits		30

Master of Music in Choral Conducting

MUSC 731	Applied Study	1-4
MUSC 748	Music Bibliography/Research Methods	2
MUSC 780	Recital (2,2)	2-4
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 Music History	
MUSC 742	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	
MUSC 709	Graduate Ensemble	1
MUSC 721	Advanced Vocal Pedagogy	3
Minimum Total Credits		30

Master of Music in Instrumental Conducting

MUSC 731	Applied Study	1-4
MUSC 748	Music Bibliography/Research Methods	2
MUSC 780	Recital (2,2)	2-4
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 Music History	
MUSC 742	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	
MUSC 709	Graduate Ensemble (1,1)	
MUSC 731	Applied Study	
Minimum Total Credits		30

Jeremy Brekke, D.A., Associate Professor

Andrew Froelich, D.M.A., Professor

Robert W. Groves, Ph.D., Professor

Sigurd Johnson, D.M.A., Associate Professor

Robert J. Jones, D.M.A., Associate Professor

Cassie Keogh, D.M.A., Assistant Professor

Kyle Mack, D.A., Associate Professor

Jo Ann Miller, D.M.A., Professor

John Miller, Ph.D., Professor

Charlette Moe, D.M.A., Assistant Professor

Katherine Noone, D.M.A., Assistant Professor

Warren Olfert, Ph.D., Associate Professor

Matthew Patnode, D.M.A., Associate Professor

Virginia Sublett, D.M.A., Professor

Michael Weber, D.M.A., Professor

Natural Resources Management

Program and Application Information

Program Director:

Dr. Shawn DeKeyser

Email:

Edward.Dekeyser@ndsu.edu

Department Location:

School of Natural Resource Sciences, Morrill Hall 205

Department Phone:

(701) 231-8180

Department Web Site:

www.ndsu.edu/nrm/

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.

Degrees Offered:

Ph.D., MNRM, M.S.

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 holistic-ecological and global-social perspectives.

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
- 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. In addition to the Graduate School requirements, applicants may be recommended or required to take the GRE general exam. Consult with the NRM Program Director.

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

To qualify for the MNRM degree, the candidate must satisfactorily complete a minimum of 32 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 Natural Resources Management Graduate Student Guidelines available on the NRM Web site (<http://www.ndsu.edu/nrm>).

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

Francis Casey, Ph.D.

Professor of Soil Science
Iowa State University, 2000

Gary K. Clambey, Ph.D.

Associate Professor of Botany/Biology
Iowa State University, 1975

Edward S. DeKeyser, Ph.D.

Associate Professor of Range Science
North Dakota State University, 2000

Gary A. Goreham, Ph.D.

Professor of Sociology
South Dakota State University, 1985

Christina Hargiss, Ph.D.

Professor of Practice
North Dakota State University, 2008

Robert Hearne, Ph.D.

Associate Professor of Agricultural Economics
University of Minnesota, 1995

Mark Andrew Meister, Ph.D.

Associate Professor of Communication
University of Nebraska, 1997

Jack Norland, Ph.D.

Assistant Professor of Natural Resources Management
North Dakota State University, 2008

G. Padmanabhan, Ph.D.

Professor of Civil Engineering,
Purdue University, 1980

David A. Rider, Ph.D.

Professor of Entomology
Louisiana State University, 1988

Dean D. Steele, Ph.D.

Associate Professor of Agricultural and Biosystems Engineering

University of Minnesota, 1991

Joseph D. Zeleznik

Extension Forester

Michigan State University, 2001

Nursing

Program and Application Information

Department Chair:	Carla Gross, Ph.D., RN
Department Location:	SGC D113
Department Phone:	(701) 231-5692
Department Web Site:	www.ndsu.edu/nursing/
Application Deadline:	Doctor of Nursing Practice, February 28 for BSN to DNP fall admission. BSN to DNP requires a March interview.
Degrees Offered:	FNP/D.N.P.
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. An individually tailored program of study is available for the advanced practice nurse with a master's degree in nursing. The program includes advanced nursing courses, support courses, clinical practica and clinical disquisition (comprehensive study or thesis).

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).

Admission Requirements

- Baccalaureate degree in nursing from a nationally accredited nursing program.
 - Undergraduate coursework in research and health assessment.
 - Current unencumbered RN licensure
 - Completed application to the Graduate School.
 - Three references: two from professional colleagues that address clinical competence and potential for graduate education, and one other reference.
 - Written narrative of professional experience and future goals.
 - Interview, if requested. (Interview required for all DNP applicants.)
-
- Family Nurse Practitioner/Doctor of Nursing Practice: A minimum of 86 (DNP) semester credits.
 - 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.
 - Clinical Dissertation

Core Requirements for D.N.P. Degrees

NURS 701	Theoretical Perspectives of the Discipline	3
NURS 702	Ethics and Health Policy in Nursing	2
NURS 704	Nursing Research/Evidence Based Practice	3
NURS 706	Health Care Delivery Systems, Financing and Informatics	3
Total Credits		11

D.N.P. Degree in Nursing

Family Nurse Practitioner Requirements (DNP)

86

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 I
NURS 816	Advanced Pathophysiology 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
PHRM 685	Economic Outcomes Assessment/Relevant Issues
STAT 725	Applied Statistics
NURS 899S	Clinical Dissertation

Mykell Barnacle, DNP, FNP

North Dakota State University, 2008

Kelly Buettner-Schmidt, Ph.D., RN

University of New Mexico, 2013

Kara Falk, MS, FNP

University of North Dakota, 2006

Amy Fisher, MA, PNP

College of St Catherine, 1992

Donna Grandbois, Ph.D., RN

North Dakota State University, 2008

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

Norma Kiser-Larson, Ph.D., CNE

University of Minnesota, 1999

Tina Lundeen, DNP, FNP

North Dakota State University, 2010

Camille Meyhoff, MSN, FNP

University of Mary, 2004

Carla Olson, MSN, FNP

University of North Dakota 2004

Heidi Saarinen, DNP, FNP

North Dakota State University, 2010

Molly Secor-Turner, Ph.D.

University of Minnesota, 2008

Shila Thompson, Ph.D., RN

South Dakota State University, 2012

Pharmaceutical Sciences

Program and Application Information

Department Chair:	Dr. Jagdish Singh
Department Location:	102 Sudro Hall
Department Phone:	(701) 231-7661
Department Web Site:	www.ndsu.edu/pharmsci/
Application Deadline:	March 15 for fall semester and October 1 for spring semester, if positions are available.
Degrees 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 Doctor of Philosophy degree. Advanced work may be selected from pharmaceutics, 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.

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.

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:

PSCI 611	Principles of Pharmacokinetics and Pharmacodynamics	3
PSCI 670	Pharmaceutics III: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

Amanda Brooks, Ph.D.

University of Wyoming, 2006

Postdoctoral: University of California San Diego, 2006-2007; University of Utah, 2008-2010

Assistant Research Professor, 2011-2014

Research interests: Biomimetics, Recombinant Protein Expression for Biomedical Devices, Controlled Drug Delivery to Combat Antibiotic Resistance

Bin Guo, Ph.D.

State University of New York at Buffalo, 1999

Postdoctoral: Burnham Institute, 1999 - 2003

Research interests: Molecular and Cell Biology of Apoptosis; Cancer Pharmacology

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

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

Stephen T. O'Rourke, Ph.D.

University of Wisconsin, 1985
Postdoctoral: Mayo Clinic and Foundation, 1985-87
Research Interests: Vascular Pharmacology

Steven Qian, Ph.D.

The University of Iowa, 1999
Postdoctoral: National Institute of Environmental Health Science (NIEHS, NIH) 2000-2004
Research Interests: Roles of Lipid Derived and Protein-Derived Free Radical Metabolites in All Kinds of Health Related Problems

R. Craig Schnell, Ph.D.

Purdue University, 1969

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

Stefan Vetter, Ph.D.

Swiss Institute of Technology (ETH) Zurich, 1998
Postdoctoral: The Scripps Research Institute, 2000-2005
Research Interest: Medicinal Protein Biochemistry

Physics

Program and Application Information

Department Chair:	Dr. Sylvio May
Graduate Coordinator:	Dr. Alan Denton
Department Location:	218 South Engineering
Department Phone:	(701) 231-8974
Department Web Site:	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.
Degrees 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 2015-2016 academic year stipend is \$17,000 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

The following equipment is available for research: atomic force microscope with multi-purpose low-noise electronic probe-station, confocal microscope, spectrometers, global positioning system, picotesla magnetometry equipment, work stations; computer clusters, resources at the NDSU Center for Computationally Assisted Science & Technology; Nd:YAG and titanium: sapphire lasers; immediate access to scanning electron microscope; low- and high-field NMR; and X-ray powder diffractometer, materials processing lasers and a full complement of materials characterization equipment through the NDSU Center for Nanoscale Science and Engineering.

The Graduate Coordinator or Chair shall assign to each incoming graduate student a temporary advisor, 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

Each student must earn at least 30 graduate credits, numbered 601-798, of which:

- at least 10 credits are Physics courses numbered 601-689 or 700-789;
- at least 16 credits are didactic courses numbered 601-689 or 700-789;
- between 6 and 10 credits are Physics 798 (Master's Thesis);
- at least one credit must be Physics 790 Graduate Seminar. Students are required to attend all seminars and colloquia.

Accelerated Master of Science

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:

- At least 21 credits are didactic Physics courses from this list:

PHYS 611, 611L, 613, 615, 655, 662, 663, 681, 685, 686, 752, 758, 761, 771, 781, 782

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 455/655, 462/662, 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.

Doctor of Philosophy

The Ph.D. program requires the completion of at least 90 graduate credits, numbered 601-899. Credits used to satisfy the requirements for the M.S. degree may be included in the total:

- 27 or more must be in letter-graded courses
- 16 are the required physics courses (752, 758, 761, 771, 781, and 790)
- No more than 12 credits are in non-physics courses. 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 M. Foard, Ph.D., Visiting Professor

North Dakota State University, 2013

Research Interests: Theoretical, Computational, Soft Matter, and Phase Separation Physics

Erik 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: High Energy Partical Theory, Nuclear Theory, FirstPrinciples Numerical Techniques for Fermi Systems

Mila Kryjevskaja, Ph.D.

University of Washington, 2008

Research Interest: Physics Education

Sylvio May, Ph.D., Department Chair

Friedrich-Schiller University, 1996

Research Interests: Physics of Lipid Membranes, Biophysics

J. Bruce Rafert, Ph.D.

University of Florida, 1979

Postdoctoral: University of South Florida, 1979-1980

Research Interests: W Serpentis Stars, Autonomous Observatories, Hyperspectral Remote Sensing Physics

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

Kenneth Lepper, Ph.D.

Oklahoma State University, 2001

Research Interests: Applied Solid State Physics (geologic materials) and Materials Characterization

Konstantin Pokhodnya, Ph.D.

Moscow Institute of Science and Technology, 1977

Research Interests: Materials, Thin Film Fabrication, Spintronics

Plant Pathology

Program and Application Information

Department Chair:

Dr. Jack Rasmussen

Department Location:

Walster Hall

Department Phone:	(701) 231-8362
Department Web Site:	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.
Degrees 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, 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.

Admissions Requirements

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. 810), 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.

The program generally requires a minimum of two years of full-time study for the M.S. degree and three years of full-time study for a doctorate, during which an overall GPA of 3.0 or better must be maintained.

For M.S. candidates, an oral defense of a research-based thesis or paper, and academic subject matter is required. Candidates for the Ph.D. will be required to pass a preliminary written and oral examination covering academic subject matter and a final oral defense of a research-based dissertation. Programs of study are developed to meet both disciplinary requirements as well as special interests of the students.

Maricelis Acevedo, Ph.D.

University of Nebraska-Lincoln, 2007

Research Interests: Rust-pathogen's Virulence Evolution, Host Resistance, Pathogen Population Diversity

Robert Brueggeman, Ph.D.

Washington State University, 2009

Research Interests: Barley Disease Resistance Gene Characterization and Deployment, Molecular Mechanisms of Host-Pathogen Interactions

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

Neil C. Gudmestad, Ph.D.

North Dakota State University, 1982

Research Interests: Ecology and Epidemiology of Plant Pathogenic Bacteria, Foliar Diseases of Potato

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: Pulse Crop and Dry Bean disease management, fungicide efficacy and resistance management, pathogen detection and diversity

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 to Manage Disease

Plant Sciences/Horticulture

Program and Application Information

Department Head:

Dr. Richard Horsley

Graduate Coordinator:

Dr. Edward Deckard

Department Location:	166 Loftsgard Hall
Department Phone:	(701) 231-7971
Department Web Site:	www.ag.ndsu.edu/plantsciences/
Application Deadline:	International applications are due May 1st for Fall and August 1 for Spring. Domestic applicants should apply at least one month prior to the start of classes.
Degrees 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 Plant Sciences and Horticulture, and to a Ph.D. degree in Plant Sciences. Specialized academic and research training in Plant Sciences is available in plant breeding and genetics, weed science, biotechnology, field and forage crop production and management, and sports and urban turfgrass management. Areas of specialization in Horticulture and Forestry include breeding and genetics, biotechnology, physiology, propagation, 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 a comprehension of the discipline and of relevant regional and global-community social issues.

The Department of Plant Sciences is located in Loftsgard Hall, completed in 1991, with modern and well-equipped research laboratories, offices for faculty and graduate students, and classrooms. Loftsgard Hall, which is part of the Plant Science Complex, 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, Cereal and Food Sciences, 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. Not quite half of the graduate students are Ph.D. candidates.

Admission Requirements

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 the Graduate School admission requirements.

Students who do not meet all 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 his/her record.

Financial Assistance

Research assistantships (half-time) are provided on a competitive basis, usually based on scholarship and potential to undertake advanced study and research. As of the 2014-15 academic year, the annual stipend generally is \$17,000 for an M.S. candidate and \$18,200 for a Ph.D. candidate, but this may vary based on the research project. Graduate tuition is waived for all students with research assistantships. A limited number of graduate fellowships are available. The information provided for the application to the Graduate School is also used to assign available assistantships to applicants. The Department of Plant Sciences also has numerous annual scholarships of \$500 to \$1000 each for outstanding Plant Sciences graduate students.

The M.S. program (Thesis Option) requires completion of at least 30 credits; this includes 10 credits of thesis research. The Ph.D. program requires completion of at least 90 credits; this includes 30 credits for an earned M.S. degree (Thesis Option) and 20 additional research credits. 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. 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.

Candidates for the M.S. degree normally satisfy all requirements within a two-year period, and 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.

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

Marcelo J. Carena, Ph.D.

Iowa State University, 1999

Research Interests: Corn Breeding

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

Kenneth F. Grafton, Ph.D.

University of Missouri, 1980

Research Interests: Dry Bean Breeding, Genetics

Greta Gramig, Ph.D.

University of Wisconsin-Madison

Research Interests: Weed Biology and Ecology

James J. Hammond, Ph.D.

University of Nebraska, 1969

Research Interests: Flax Breeding, Biometrics, Computer Programming

Harlene Hatterman-Valenti, Ph.D.

Iowa State University, 1993

Research Interests: High-Value Crop Production

Theodore C. Helms, Ph.D.

Iowa State University, 1986

Research Interests: Soybean Breeding, Genetics

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

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

Rodney G. Lym, Ph.D.

University of Wyoming, 1979
Research Interests: Weed Science Perennial Weeds

Frank A. Manthey, Ph.D.

North Dakota State University, 1985
Research Interests: Durum and Pasta Quality

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

Michael S. McMullen, Ph.D.

University of Minnesota, 1976
Research Interests: Oat Breeding, Genetics

Kevin McPhee, Ph.D.

University of Idaho, 1995
Research Interests: Pulse Crop Breeding

Mohamed Mergoum, Ph.D.

Colorado State University, 1991
Research Interests: Hard Red Spring Wheat Breeding

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

Mukhlesur Rahman, Ph.D.

University of Manitoba, 2007
Research Interests: Canola Breeding

Joel K. Ransom, Ph.D.

University of Minnesota, 1982
Research Interests: Small Grains

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

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

Richard K. Zollinger, Ph.D.

Michigan State University, 1989

Research Interests: Weed Science Applied Weed Control

Alan J. Zuk, Ph.D.

Kansas State University, 2005

Research Interests: Sports and Urban Turfgrass Management

Adjunct

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

Bryan Brunner, Ph.D.

Michigan State University, 1992

Research Interests: Breeding Tropical/subtropical Crops

Larry G. Campbell, Ph.D.

Kansas State University, 1974

Research Interests: Sugarbeet Genetics

Flavio Capettini, Ph.D.

University of Minnesota, 1999

Research Interests: Barley Breeding

Patrick M. Carr, Ph.D.

Montana State University, 1989

Research Interests: Sustainable Agriculture

Shiaoman Shaw Chao, Ph.D.

North Carolina State University, 1984

Research Interests: Small Grains Genomics

Wun Shaw Chao, Ph.D.

University of California-Davis, 1996

Research Interests: Perennial Weeds

Lynn S. Dahleen, Ph.D.

University of Minnesota, 1989

Research Interests: Barley Genetics, Biotechnology

Justin D. Faris, Ph.D.

Kansas State University, 1999

Research Interests: Wheat Molecular Genetics

Michael E. Foley, Ph.D.

University of Illinois, 1982

Research Interests: Weed Biology

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

Yong Qiang Gu, Ph.D.

University of California, 1994

Research Interests: Genetics

Elcio P. Guimaraes, Ph.D.

Iowa State University, 1985

Research Interests: Cereal Plant Breeding

Liebao Han, Ph.D.

China Agricultural University, 1996

Research Interests: Turfgrass Science

David P. Horvath, Ph.D.

Michigan State University, 1993

Research Interests: Perennial Weed Physiology

Khwaja Hossain, Ph.D.

University of Wales, 1995

Research Interests: Molecular Genetics and Genomics

Brent S. Hulke, Ph.D.

University of Minnesota, 2007

Research Interests: Flax and Sunflower Genetics

Chao C. Jan, Ph.D.

University of California, Davis, 1974

Research Interests: Sunflower Cytogenetics

Prem P. Jauhar, Ph.D.

Indian Agricultural Research Institute, 1963

Research Interests: Wheat Cytogenetics

Brian Jenks, Ph.D.

University of Nebraska, Lincoln, 1996

Research Interests: Integrated Weed Management

Edward C. Lulai, Ph.D.

North Dakota State University, 1978

Research Interests: Potato Physiology

R. Macchiavelli, Ph.D.

Pennsylvania State University, 2006

Research Interests: Statistics/Biometry

Carlos Ortiz, Ph.D.

University of Arkansas, 1993

Research Interests: Genetics-Starchy Crops and Turf

Timothy Porch, Ph.D.

Cornell University, 2001

Research Interests: Dry Bean Breeding and Genetics

Lili Qi, Ph.D.

Nanjing Agricultural University, 1997

Research Interests: Wheat Genetics

Gerald J. Seiler, Ph.D.

North Dakota State University, 1980

Research Interests: Sunflower and Sugarbeet Germplasm

Joseph R. Sowokinos, Ph.D.

University of North Dakota, 1969

Research Interests: Potato Physiology

Jeffrey C. Suttle, Ph.D.

Michigan State University, 1979

Research Interests: Potato Physiology

Linda Wessel-Beaver, Ph.D.

University of Illinois, 1981

Research Interests: Tropical Pumpkin and Squash Breeding

Jochum Wiersma, Ph.D.

University of Minnesota, 1995

Research Interests: Small Grains

Steven S. Xu, Ph.D.

North Dakota State University, 1994

Research Interests: HRSW Development

Psychological Clinical Science

Program and Application Information**Department Chair:**

Dr. James Council

Department Location:

232 B2 Minard Hall

Department Phone:

(701) 231-7065

Department Web Site:www.ndsu.edu/psychology/graduate_programs/psychological_clinical_science/**Application Deadline:**

January 15

Degrees 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.

Admissions Criteria

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.

Evaluation and Intervention

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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

9

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 or PSYC 899	Master's Thesis 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

4

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

James R. Council, Ph.D.

University of Connecticut, 1984

Field: Clinical; Personality, Assessment, Clinical and Experimental Hypnosis

Keith Donohue, Ph.D.

Florida State University, 2011

Field: Clinical; Substance Abuse, Research Methods, and Teaching

Robert Dvorak, Ph.D.

University of South Dakota, 2012

Field: Clinical; Self-Regulation, Health, and Addiction

Kathryn Gordon, Ph.D.

Florida State University, 2008

Field: Clinical; Disordered Eating, Suicidal Behavior

Wendy P. Gordon, Ph.D.

University of Illinois at Urbana-Champaign, 2002

Field: Child Development, Social Development and Peer Relations

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

Paul D. Rokke, Ph.D.

University of Houston, 1985

Field: Clinical; Psychopathology

Psychology

Program and Application Information

Department Chair:	Dr. James Council
Department Location:	232 B2 Minard Hall
Department Phone:	(701) 231-7065
Department Web Site:	www.ndsu.edu/psychology/graduate_programs/
Application Deadline:	January 15
Degrees Offered:	Ph.D.
Test Requirement:	GRE
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. We have three doctoral programs that prepare students for research and academic careers: Psychological Clinical Science, Visual and Cognitive Neuroscience, and Health/Social Psychology.

Doctoral Programs

Students enter one of three Ph.D. programs: Psychological Clinical Science, Visual and Cognitive Neuroscience, or Health/Social Psychology. These areas represent the strengths of the department's faculty in experimental research, as well as three of the most active and cutting-edge areas in the field of psychology. The 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 all three programs. 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. However, applications will be considered after this date to the extent that space in the program is still available.

Financial Assistance

Students are routinely supported through research and teaching 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 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.

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 30 credit hours must be in approved didactic courses, and at least 18 of these must be at the 700 level.
4. Complete quantitative and research methods courses

PSYC 640	Experimental Methods	6
& PSYC 762	and Advanced Research Methods and Analysis	
PSYC 761	Applied Research Methods (for Health/Social)	3
5. Complete core courses in the specific program area: Health & Social Psychology - four courses:

PSYC 733	Social Judgment	3
PSYC 771	Social/Health Psychology Research	3
PSYC 782	Emotions	3
PSYC 787	Advanced Social Psychology and Health	3

Visual & Cognitive Neuroscience:

Select three of the following:

PSYC 718	Visual Neuroscience	
PSYC 720	Advanced Topics in Cognitive Neuroscience	
PSYC 727	Advanced Topics in Visual Perception	
PSYC 731	Fundamental Processes in Cognition	
PSYC 760	Research Methods in Visual and Cognitive Neuroscience	
PSYC 764	Advanced Topics in Attention	

Psychological Clinical Science:

PSYC 755	Empirically Supported Interventions I	4
PSYC 756	Empirically Supported Interventions II	4
PSYC 770	Testing and Assessment	3
PSYC 672	Advanced Psychopathology	3
or PSYC 673	Child Psychopathology and Therapy	
PSYC 758	Diversity in Clinical Psychology	3
PSYC 794	Practicum/Internship	1-8
PSYC 795	Field Experience	1-15
6. Complete three (for Psychological Clinical Science), two (for Health/Social students), or one (for Visual & Cognitive Neuroscience students) breadth courses at the graduate level from area outside specialty track (which can include approved courses from other departments).
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. Teach one undergraduate course under the supervision of a faculty member, after completion of COMM 702 Introduction to College Teaching in the Humanities and Social Sciences, or STEM 810 Teaching College Science.
10. 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.

11. 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

James R. Council, Ph.D.

University of Connecticut, 1984

Field: Clinical Psychology; Personality, Assessment, Clinical and Experimental Hypnosis

Keith F. Donohue, Ph.D.

Florida State University, 2011

Field: Clinical Psychology; Alcohol, Research Methods, Teaching

Robert D. Dvorak, Ph.D.

The University of South Dakota, 2012

Field: Clinical Psychology; Selfregulation, Health-Risk Behaviors, & Ecological Momentary Assessment

Kathryn H. Gordon, Ph.D.

Florida State University, 2008

Field: Clinical Psychology, Eating Disorders, Suicidal Behavior

Robert D. Gordon, Ph.D.

University of Illinois at UrbanaChampaign, 1999

Field: Cognitive Neuroscience, Attention, Representation, Visual Information Processing

Wendy Troop-Gordon, Ph.D.

University of Illinois at UrbanaChampaign, 2002

Field: Child Development, Social Development and Peer Relations

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

Kevin D. McCaul, Ph.D.

University of Kansas, 1978

Field: Social Psychology; Health Behavior, Applied Social Psychology

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

Paul D. Rokke, Ph.D.

University of Houston, 1985

Field: Clinical Psychology; Psychopathology

Clay Routledge, Ph.D.

University of Missouri-Columbia, 2005

Field: Health and Social Psychology

Laura E. Thomas, Ph. D.

University of Illinois, 2008

Field: Embodied cognition, Links between action, perception, and cognition

David A. Wittrock, Ph.D.

State University of New York at Albany, 1990

Field: Clinical Psychology; Behavioral Medicine, Headache, Stress, Appraisal and Coping

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

Jessica T. Kaster, Ph.D.

University of South Dakota, 2004

Field: Clinical Psychology; Child Psychopathology, Assessment

H. Katherine O'Neill, Ph.D.

University of North Dakota, 1991

Field: Clinical Psychology; Psychopathology, Addiction, Anxiety

Jennifer A. Redlin, M.S.

North Dakota State University, 1999

Field: Clinical and Behavioral Psychology

Public Health

Program and Application Information

Program Director:

Dr. Donald Warne

Program Coordinator:

Stefanie Meyer

Department Location:

Research Park Building 2

Department Phone:

(701) 231-6549

Department Web Site:

www.ndsu.edu/publichealth/

Application Deadline:	March 1, 2016
Degrees Offered:	MPH
Test Requirement:	GRE The PCAT/MCAT are acceptable substitutes for the GRE requirement. Applicants who wish to substitute MCAT scores for the GRE must include the MCAT score validation .pdf with application.
English Proficiency Requirements:	TOEFL iBT 90; IELTS 6.5

Program Description

Public health is defined as the practice of helping members of society live healthier, longer lives. Public health is both an art and a science, and is practiced by multidisciplinary teams of professionals whose training spans a wide array of medical, social, and physical sciences. Public health focuses on 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.

The program focuses on rural health, health promotion and prevention, disease state management, and related activities of interest to North Dakota public health care practitioners and policy makers. Specializations include American Indian public health, public health in clinical systems, health promotion, and management of infectious diseases.

Admission Requirements

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. Strong preference for admission will be given to applicants with at least one year of practical experience in their field, including practical field experience gained within an academic program.

Minimum Program Admission Requirements

In addition to the Graduate School admission requirements, applicants must have 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.

The Admissions Committee will invite selected applicants for an interview on the basis of the Committee's review of all submitted application materials.

Final decisions will be made after all interviews are completed. Satisfactory completion of a background check is required prior to admission.

Policy on Transfer of Credit

A limited amount of graduate work completed at a regionally accredited North American institution prior to, or after matriculation in the program, may be applied toward the MPH. Graduate work is considered for transfer only on an individual basis and only after the student has completed satisfactory work in the program. Transfer credits approved by the student's adviser, course instructor, Program Director, and the Dean of the Graduate School will be included in the Program of Study for the MPH degree and recorded on the transcript.

The basic purpose of the transfer policy is to ensure that transferred work is of comparable content, level, timeliness, and quality to that of NDSU's and included on a master's degree program of study. The following policies are generally applicable to the acceptance of the graduate work for transfer:

- The work must have been undertaken at an accredited North American institution.
- The student must have been enrolled at that institution as a graduate student
- The work must have received graduate credit at the institution where it was earned.
- The student must have earned a grade of B or better.
- The work must be less than seven years old at the time the MPH degree is awarded.

The maximum amount of transfer credit that will be accepted toward the MPH degree is nine (9) semester credit hours.

Required Coursework (Council on Education for Public Health Core Area)

Fall		
MPH 731	Biostatistics (Biostatistics)	3
MPH 741	Social and Behavioral Sciences in Public Health (Social & Behavioral Sciences)	3
MPH 704	Leading and Managing Public Health Systems (Health Services Administration)	3
Spring		
MPH 710	Healthcare Delivery in the United States (Health Services Administration)	3
MPH 720	Environmental Health (Environmental Health)	3
MPH 751	Essentials in Epidemiology (Epidemiology)	3
MPH 793	Individual Study (Master's Paper*)	3

MPH 794	Practicum	3
Specialization Courses		18
Total Credits		42

***Master's Paper**

The MPH master's paper is a requirement for graduation for students in the Master of Public Health (MPH) Program. This is an opportunity to work on public health projects under the direction of faculty and community public health practitioners or researchers. The goal is to synthesize, integrate and apply the skills and competencies acquired in the MPH Program to a public health problem. Completion of the MPH master's paper requires both written and oral components.

Practicum/Internship

Concepts and competencies learned from MPH coursework are integrated through a minimum of 240 hours practicum that provides an opportunity to apply knowledge in a practice setting. A wide range of settings and opportunities are available and are individually tailored to assure competence in general MPH and specialization-specific skills. The practicum is designed to meet student goals, specialization criteria, and the needs of the agencies or institutions involved. The practicum is selected by the student in consultation with faculty and approved by the adviser. This experience is usually completed in the student's final term in the program and often results in the capstone project written report and presentation. However, students may register for 1 to 3 credits, repeated up to 3 times if appropriate.

All work must be approved in advance by the Director of the MPH program. Students cannot receive credit for past work experience.

For more information about MPH specializations, please visit the MPH website <http://www.ndsu.edu/publichealth/specializations/>.

American Indian Public Health

Donna Grandbois, RN, Ph.D.
Linda Frizzell, Ph.D.
Donald Warne, M.D., M.P.H.

Public Health in Clinical Systems

Molly Secor-Turner, Ph.D.
Mark Strand, Ph.D.
Abby Gold, Ph.D., M.P.H., L.R.D.

Health Promotion

Ardith Brunt, Ph.D., R.D.
Wonwoo Byun, Ph.D.
Mary Larson, Ph.D., M.P.H., L.R.D., C.D.E.

Infectious Disease

Paul Carson, M.D.
Nathan Fisher, Ph.D.
Birgit Pruess, Ph.D.
Jane Schuh, Ph.D.

Public Health Certificates

Program and Application Information

Program Director:	Dr. Donald Warne
Program Coordinator:	Stefanie Meyer
Department Location:	Research Park Building 2
Department Phone:	(701) 231-6549
Department Web Site:	www.ndsu.edu/publichealth/certificate/
Application Deadline:	March 1, 2015
English Proficiency Requirements:	TOEFL ibT 71; IELTS 6

Admission Requirements

Admission requirements for the Public Health certificate programs, In addition to Graduate School requirements, applicants to the Public Health certificate program must have

- 3.0 GPA for undergraduate and any graduate coursework
- 3 Letters of Recommendation

Coursework

General Public Health Option

The General option includes the following 18 credits and can be completed in one academic year.

MPH 704	Leading and Managing Public Health Systems	3
MPH 710	Healthcare Delivery in the United States	3
MPH 720	Environmental Health	3
MPH 731	Biostatistics	3
MPH 741	Social and Behavioral Sciences in Public Health	3
MPH 751	Essentials in Epidemiology	3
Total Credits		18

American Indian Public Health Option

The American Indian Public Health option includes the following 18 credits and can also be completed in one academic year.

MPH 704	Leading and Managing Public Health Systems	3
MPH 771	American Indian Health Policy	3
MPH 772	American Indian Health Disparities	3
MPH 773	Cultural Competence in Indian Health	3
MPH 774	Research Issues in Tribal Communities	3
MPH 775	Case Studies in Indian Health	3
Total Credits		18

General Public Health option

The General option includes the following 18 credits and can be completed in one academic year.

- MPH 704 Leading and Managing Public Health Systems
- MPH 710 Health Care Delivery in the US
- MPH 720 Environmental Health
- MPH 731 Biostatistics
- MPH 741 Social and Behavioral Sciences in Public Health
- MPH 751 Epidemiology

The American Indian Public Health option includes the following 18 credits and can also be completed in one academic year.

- MPH 704 Leading and Managing Public Health Systems
- MPH 771 American Indian Health Policy
- MPH 772 American Indian Health Disparities
- MPH 773 Cultural Competence in Indian Health
- MPH 774 Research Issues in Tribal Communities
- MPH 775 Case Studies in Indian Health

Range Sciences

Program and Application Information

Director:

Dr. Frank Casey, School of Natural Resource Sciences

Program Leader:

Dr. Kevin Sedivec

Email:	Kevin.Sedivec@ndsu.edu
Department Location:	201 Morrill Hall
Department Phone:	(701) 231-7582
Department Web Site:	www.ndsu.edu/range/
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.
Degrees 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, ecosystem science, vascular plant systematics, and natural resources management.

Student research and academic programs are tailored to individual student needs and interests. Interdisciplinary approaches to range science programs are fostered.

Admissions Requirements

The Range Science graduate program is open to all qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements (p. 810), the applicant must have adequate preparation in range science or in a complementary area of natural sciences, have a background or interest in agriculture, and show potential to undertake advanced study and research as evidenced by academic performance and experience.

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.

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 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.

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.

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.

Edward S. DeKeyser, Ph.D.

North Dakota State University, 2000

Research Interests: Rangeland Ecology, Grazing Management, Wetland Ecology and Assessment

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

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

Kevin K. Sedivec, Ph.D.

North Dakota State University, 1994

Research Interests: Grazing Systems and Wildlife Habitat, Reclamation, 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

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

Program and Application Information

Department Chair:	Dr. Gary Totten
Graduate Coordinator:	Dr. Miriam Mara
Email:	miriam.mara@ndsu.edu
Department Location:	318 Minard Hall
Department Phone:	(701) 231-7143
Department Web Site:	http://www.ndsu.edu/english/
Application Deadline:	February 1 for fall semester only
Degrees Offered:	Ph.D.
English Proficiency Requirements:	TOEFL iBT 100; IELTS 7

Doctor of Philosophy

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.

Admission Requirements

- 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
 - scholarship 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 records
- when applicable, a letter stating your interest in and qualifications for a teaching assistantship.

Preferred additional materials:

- Practical and / or Professional writing sample not to exceed 10 pages

Financial Assistance

Teaching assistantships are available and are based on the applicant's scholastic record and letters of recommendation. However, the student must first make application to the Graduate School and be accepted for admission before she/he is eligible for an assistantship in the Department of English. Letters of application for teaching assistantships should be submitted at the same time as the application to the program is submitted to the graduate school and should specify experience and qualifications.

Graduate students are awarded teaching assistantships for the academic year only. As of the 2014-15 academic year, the annual stipend is \$14,000. University graduate tuition charges (not fees) are waived for all TAs. Teaching Fellowships are available to selected TAs after completing course work. Moreover, the Department of English annually awards the Rooney Scholarship (2014: \$1,220) and the Madeline S. Gittings Scholarship (2014: \$1,000) to deserving graduate students.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits at NDSU. Students must take a minimum of 30 credits at the 700 level.

The Ph.D. program requires 90 credits beyond the baccalaureate degree and a minimum of 60 graduate credits at NDSU. Students must take a minimum of 30 credits at the 700 level.

Students admitted to the Ph.D. are required to demonstrate foreign language competency by the time they begin to write the dissertation. Students may meet this requirement in one of the following ways:

1. Demonstrate advanced reading competency in one foreign language equivalent to successful completion of a second-semester, third-year (300-level, 6th semester) college language course.
2. Demonstrate intermediate reading competency in two foreign languages equivalent to successful completion of two second-semester, second-year (200-level, 4th semester) college language courses.
3. Demonstrate intermediate reading competency in one foreign language equivalent to successful completion of a second-semester, second-year (200-level, 4th semester) college language course and, in consultation with the student's advisor and the graduate director, demonstrate competency in one special research skill (written rationale will be required at time of request). See Graduate Handbook for additional information.

Within the first semester of graduate work, each student is assigned an academic adviser who helps in overseeing the student's plan of study. A graduate student in English should enroll in no more than 3 credits of ENGL 793, Individual Study/Tutorial, during his/her graduate career. Exceptions are provided for through a graduate form signed by the chair of the department and the adviser.

Plan of Study

Core Courses

ENGL 755	Composition Theory	
ENGL 760	Graduate Scholarship	
ENGL 764	Classroom Strategies For TA'S	
Research Methods		6
ENGL 756	Composition Research	
ENGL 762	Critical Theory	
COMM 708	Advanced Qualitative Methods in Communication Research	
COMM 767	Rhetorical Criticism	
HIST 701	Methods of Historical Research	
SOC 700	Qualitative Methods	
Didactic credits		33
18 credits must be in Rhetoric and Writing courses (two courses must be from English and two from Communication) and		
15 credits of Elective courses (any graduate-level class not listed elsewhere on the student's plan of study, approved by student's adviser).		
English studies courses (literature and linguistics)		24
Students may transfer in graduate credits in this area or take English 600 and 700 level literature and linguistics classes not listed as part of the English Ph.D.		
Experiential Learning		6
Teaching mentorships, field experiences, and internships, inside or outside the academy in research, administrative, editing, consulting, or writing roles		
Complete Doctoral Comprehensive Exams when 72 credits are complete. The dissertation proposal is submitted after the successful completion of the comprehensive exams.		
ENGL 899	Doctoral Dissertation	1-15

**Graduate students are strongly advised to take Core courses in their first year in the program or as soon as these courses are offered.*

Elizabeth Birmingham, Ph.D.

Iowa State University, 2000

Field: Rhetoric and Professional Communication, Gender Studies, Architectural History, Theory, and Criticism

Kevin Brooks, Ph.D.

Iowa State University, 1997

Field: Rhetoric and Professional Communication, Computers and Composition, Writing Program Administration

Muriel Brown, Ph.D.

University of Nebraska, 1971

Field: Medieval Literature, Modern Drama, Women's Studies

Linda L. Helstern, Ph.D.

Southern Illinois University-Carbondale, 2001

Field: Native American Literature, Modernism, Contemporary Poetry, Literature and the Environment

R.S. Krishnan, Ph.D.

University of Nebraska, 1981

Field: Restoration and 18th-Century British Literature, Postmodern Theories, British Novel, Postcolonial Literature

Andrew Flood Mara, Ph.D.

University of New Mexico, 2003

Field: Technical and Professional Communication, New Media, Rhetoric and Composition

Miriam O'Kane Mara, Ph.D.

University of New Mexico, 2003

Field: Postcolonial Literature, Irish Modern and Contemporary Literature, British Victorian through Contemporary Literature

Bruce Maylath, Ph.D.

University of Minnesota, 1994

Field: International Technical Communication, Rhetoric and Composition, Linguistics

Robert O'Connor, Ph.D.

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.

Rensselaer Polytechnic Institute, 1988

Field: Rhetoric Theory and History, Rhetoric of Science, Rhetoric of Religion, Technical Communication

Amy Rupiper Taggart, Ph.D.

Texas Christian University, 2002

Field: Writing and Rhetoric, Pedagogy, Literacy Studies

Verena Theile, Ph.D.

Washington State University, Pullman, 2006

Field: 16th-/17th-Century Literature, Early Modern Drama, European Literature, Cultural Theory

Gary Totten, Ph.D.

Ball State University, 1998

Field: Late 19th-/Early 20th-Century American Literature, Travel Literature, Multi-Ethnic American Literature

STEM Education PhD (Interdisciplinary)

Program and Application Information

Acting Program Director:	Dr. William Martin
Department Location:	FLC 210
Department Phone:	(701) 231-7104
Department Web Site:	www.ndsu.edu/csme/stem_education_graduate_programs/
Degrees 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 purpose of this interdisciplinary program is to prepare future college faculty whose research focus is on teaching and learning at the collegiate level and who can successfully teach at the undergraduate/graduate level in their selected STEM discipline.

Coursework will center on graduate-level courses in the discipline area, a common core of STEM Education courses, and elective courses focused on research training. The candidate's dissertation research will be supervised by an interdisciplinary team of faculty and 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 will have an academic home in the STEM department/program of their discipline preference. Graduate committee membership will include faculty from the STEM Education program and from the department/program of discipline preference.

The STEM Education Ph.D. program works in collaboration with (a) existing educational research programs in STEM disciplines (e.g., Biological Sciences); (b) NDSU's College Teaching Certificate Program; and (c) extramurally-funded STEM educational research projects already established at NDSU.

Applicants must have a Master's Degree or equivalent in Education or a STEM discipline for full admission. 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. curriculum, teaching, learning, and assessment,
2. educational research, and
3. content expertise within their discipline.

Core Didactic Courses (9 SH):

STEM 810	Teaching College Science	3
STEM 820	STEM Curriculum and Instruction	3
STEM 830	Research Methods in STEM Education	3

Educational Research Seminar (continuing enrollment throughout program, each Fall & Spring semester)

EDUC 790	Graduate Seminar	1
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Elective Graduate Courses in STEM Discipline and/or STEM Education		18
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(minimum of 18 SH, to meet minimum of 27 SH coursework requirement)

Didactic courses selected with approval of the graduate committee to strengthen preparation in the STEM discipline, educational research, and/or in education.

Doctoral Dissertation (minimum 9 credits)

EDUC 899	Doctoral Dissertation
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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.

William Martin, Mathematics/STEM Education

Abraham Ayebo, Mathematics/Education

Bradley Bowen, Engineering/Education

Warren Christensen, Physics/STEM Education

Paul Kelter, Director, STEM Education PhD program

Mila Kryjevskaja, Physics/STEM Education

Jennifer Momsen, Biology/STEM Education

Lisa Montplaisir, Biology/STEM Education

James Nyachwaya, Chemistry/Education

Erika Offerdahl, Biology/STEM Education

Sociology

Program and Application Information

Interim Department Chair:

Dr. Miriam Mara

Department Location:

Minard Hall Rm. 428

Department Phone:

(701) 231-8657

Department Email:

ndsusoc.anth@ndsusoc.edu

Department Web Site:

http://www.ndsu.edu/socanth/sociology/masters_program/

Application Deadline:

Applicants who seek funding must apply by February 15 for fall semester and September 15 for spring semester. Applications are accepted for all semesters.

Degrees 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. 810), 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.

Degree Requirements

Students must complete a minimum of 30 credits and a master's thesis for the thesis option, or a minimum of 35 credits and a paper for the comprehensive study option. An oral defense of the thesis or the paper is required.

Requirements for the M.S. degree in sociology are as follows:

1. Successfully complete

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).
3. Complete a research-based thesis or comprehensive study paper, and pass an oral defense of the thesis or paper administered by the student's supervisory committee.

Gina Aalgaard Kelly, Ph.D.

University of Minnesota, 2007

Research Interests: Medical Sociology, Aging/Social Gerontology, Quantitative Methods

Pamela Emanuelson, Ph.D.

University of South Carolina, 2008

Research Interests: Small Group Processes, Social Psychology, Mathematical Sociology, Economic Sociology, Sociopolitical Evolution

Gary A. Goreham, Ph.D.

South Dakota State University, 1985

Research Interests: Rural Sociology, Community, Family, Research Methods, Sociology of Religion, Sociology of Agriculture

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

Michael J. Yellow Bird, Ph.D.

University of Wisconsin, 1994

Indigenous Tribal Studies, Social Welfare, Social Work

Software Engineering

Program and Application Information

Department Head:

Dr. Brian M. Slator

Graduate Coordinator:

Dr. Kenneth Magel

Department Location:

258 QBB (formerly IACC)

Department Phone:	(701) 231-8562
Department Email:	gradinfo@cs.ndsu.edu
Department Web Site:	cs.ndsu.edu/
Application Deadline:	M.S. and Ph.D. -- February 1 for fall admission; September 1 for spring admission*, M.S.E. and Certificate: -- June 1 for fall semester; November 1 for spring semester*; No summer admission for any Software Engineering Program
Degrees Offered:	Ph.D., M.S., M.S.E., Certificate
Test Requirement:	GRE (M.S. and Ph.D. only)
English Proficiency Requirements:	TOEFL ibT 79 IELTS 6.5

**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.*

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 cs.ndsu.edu or contact the Computer Science Department at (701) 231-8562 or gradinfo@cs.ndsu.edu.

Admissions Requirements

In addition to the Graduate School requirements (p. 810), 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.

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.

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.

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

Requires 10 semester credit hours consisting of

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 790	Graduate Seminar (in appropriate area as approved by the student's adviser) Examples include: Database Systems, Extreme Programming, Formal Methods in Software Engineering, Intelligent Agents)	1
An extensive project of approximately one third of a semester incorporated into whichever of the above courses the student and her (his) adviser selected. The project may be job related. This project serves as the capstone experience for the student.		
Total Credits		10

Sample Certificate Combinations:

Software Design:

CSCI 713	Software Development Processes	3
CSCI 715	Software Requirements Definition and Analysis	3
CSCI 716	Software Design (+ Seminar with project)	3

Software Testing:

CSCI 713	Software Development Processes	3
CSCI 714	Software Project Planning and Estimation	3
CSCI 718	Software Testing and Debugging (+ Seminar with project)	3

Software Project Management:

CSCI 713	Software Development Processes	3
CSCI 714	Software Project Planning and Estimation	3
CSCI 715	Software Requirements Definition and Analysis (+ Seminar with project)	3

Software Construction:

CSCI 713	Software Development Processes	3
CSCI 716	Software Design (+ Seminar with project)	3
CSCI 717	Software Construction (+ Seminar with project)	3

Master of Software Engineering

Offered through on-campus classes or through Distance and Continuing Education classes. Please note that F-1 and J-1 non-immigrant international students are only allowed to take one online course per semester.

Completion of 12 courses listed below with grades of B or better and two-semester sequence of CSCI 771 and CSCI 772 Software Development Project. Any CSCI 700 or 800 level course can be substituted for a required course with departmental approval, except CSCI 771 and CSCI 772.

CSCI 713	Software Development Processes	3
CSCI 714	Software Project Planning and Estimation	3
CSCI 715	Software Requirements Definition and Analysis	3

CSCI 716	Software Design	3
CSCI 717	Software Construction	3
CSCI 718	Software Testing and Debugging	3
CSCI 724	Survey of Artificial Intelligence	3
CSCI 765	Introduction To Database Systems	3
CSCI 771	Software Development Project I	3
CSCI 772	Software Development Project II	3
CSCI 846	Development of Distributed Systems	3
CSCI 847	Software Complexity Metrics	3
Total Credits		36

- Successful completion of an Internet-based 16 hour module on Computer Ethics. This module will be required for students starting the program in fall, 2015 or later.
- Maximum of 4 courses may be attempted in any one semester. If a course is started in a particular semester, it must be dropped or completed within that semester.

Master of Science in Software Engineering

Core Courses 12

Students must complete the core within five semesters of their entering the program.

CSCI 713	Software Development Processes	
CSCI 715 or CSCI 718	Software Requirements Definition and Analysis 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	

Six credits (Thesis students) or 3 credits (Paper students) of other Computer Science or Computer Engineering courses selected with and approved by the student's graduate advisory committee. 3-6

CSCI 790	Graduate Seminar	3
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In software engineering areas (1 credit each). These seminars must be approved in advance by the student's graduate adviser (a form is provided for this purpose).

Research Component: Either a thesis option or comprehensive study paper based on a significant software development project undertaken by the student, perhaps as a member of a team, either at the University or as part of a job. This project will require design, implementation, and testing of a significant piece of computer software.

CSCI 797 or CSCI 798	Master's Paper Master's Thesis	3-6
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Total Credits 33

- The Software Engineering Comprehensive Examination. This examination shall include integrative questions on the 4 courses which make up the software engineering core. The exam must be passed within the first 5 semesters of the program. Each student is allowed a maximum of 2 attempts to pass this examination. Students are encouraged to complete the comprehensive examination early in their program.
- Up to 9 previously earned credits from an educational institution of recognized standing with a grade of B or better may be used toward the 33 total credits required for the master degree, upon approval by the advisor, committee members and head of the department.
- A Final Oral Examination on the paper and course work. This examination shall include questions on design choices, implementation methods, and testing choices for the student project.

Ph.D. in Software Engineering

Program Requirements: 90 semester hours

- All Master of Science in Software Engineering from NDSU requirements or their equivalent in transfer or examination credits.
- Satisfactory completion of the Ph.D. Qualifying Examination. This examination will consist of integrative questions on the 4 core courses described under the Master of Science degree. Students must complete this requirement within their first 7 semesters of participation in the program.
- Minimum of 15 hours of course work chosen from the courses listed below and not duplicating any items used to satisfy requirements for the Master of Science degree:

Select five of the following:

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

- Additional courses totaling up to 9 hours can be taken in Computer Science or ECE-Computer Engineering chosen by the student and adviser, then approved by the Student's Supervisory Committee.
- Thirty-six to 45 semester credit hours for research, preparation, and defense of a dissertation in Software Engineering. These hours will be graded on a Satisfactory/Unsatisfactory basis.

Additional course work requirements:

1. A student holding a Master of Science degree from an educational institution of recognized standing may use:
30 credits of previously completed coursework toward the 90 total credits required for the doctoral degree **OR**
Up to 9 credits previously earned from an educational institution of recognized standing with a grade of B or better may be used toward the 90 total credits required for the doctoral degree.
2. The 90 credits may include a maximum of 15 credits of independent study and seminar hours. Seminars are limited to four of those credits.
3. The student's supervisory committee, the department chair, college dean, and the graduate dean all must approve the course work on the plan of study at least 4 semesters before graduation.

Anne Denton, Ph.D.

University of Mainz, 1996

Research Interests: Data Mining, Bioinformatics, Scientific Informatics, Databases, Geospatial Data, Cloud Computing

Wei Jin, Ph.D.

State University of New York at Buffalo, 2008

Research Interests: Text and Web Mining, Information Retrieval and Extraction, Machine Learning, Bioinformatics and Health Informatics

Dean Knudson, Ph.D.

Northwestern University, 1972

Research Interests: Software Engineering, International Capstone Programs, University/Industry Relationships

Jun Kong, Ph.D.

University of Texas, Dallas, 2005

Research Interests: Human Computer Interaction, Mobile Computing, Software Engineering

Juan (Jen) Li, Ph.D.

University of British Columbia, 2008

Research Interests: Large-scale Distributed System (P2P and Cloud Computing, Distributed Search, Routing Algorithms), Semantic Web Technologies, Social Networks, Information Retrieval, Knowledge Discovery

Simone Ludwig, Ph.D.

Brunel University, 2004

Research Interests: Swarm Intelligence, Evolutionary Computation, Fuzzy Reasoning, Cloud Computing

Kenneth Magel, Ph.D.

Brown University, 1977

Research Interests: Software Engineering, Human-Computer Interfaces, Software Complexity, and Software Design

Kendall Nygard, Ph.D.

Virginia Polytechnic Institute and State University, 1978

Research Interests: Data Science, Optimization Modeling, Smart Grid, Sensor Networks, Agents, Artificial Intelligence, Security, Adaptive Systems, Swarm Intelligence

William Perrizo, Ph.D.

University of Minnesota, 1972

Research Interests: Data Mining, Distributed Database Systems, Centralized Database Systems, Data Security, Bioinformatics

Saeed Salem, Ph.D.

Rensselaer Polytechnic Institute, 2009

Research Interests: Bio-Informatics and Data Mining

Brian Slator, Ph.D.

New Mexico State University, 1988

Research Interests: Artificial Intelligence, Educational Media

Vasant Ubhaya, Ph.D.

University of California-Berkeley, 1971

Research Interests: Algorithm Analysis, Approximation and Optimization

Gursimran Walia, Ph.D.

Mississippi State University, 2009

Research Interests: Empirical Software Engineering, Software Errors and Software Quality Improvement, Requirements Engineering, Human Cognition in Software Engineering, Managing and Estimating Software Quality

Changhui Yan, Ph.D.

Iowa State University, 2005

Research Interests: Bioinformatics, Computational Biology, Genomics, Machine Learning, Data Mining, Big Data, Cloud Computing

Professors of Practice

Pratap Kotala, Ph.D.

North Dakota State University, 2015

Oksana Myronovych, Ph.D.

North Dakota State University, 2015

Adjunct Faculty

Hyunsook Do, Ph.D.

University of Nebraska, 2007

Research Interests: Software Engineering, Software Testing, Regression Testing, Software Maintenance, Requirements Verification, Software Empirical Methodologies

Soil Science

Program and Application Information**Director:**

Dr. Frank Casey, School of Natural Resource Sciences

Program Leader:

Thomas DeSutter

Email:

Thomas.DeSutter@ndsu.edu

Department Location:

106 Walster

Department Phone:

(701) 231-8901

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.

Degrees Offered:

Ph.D., M.S.

Test Requirement:

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 and 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 genesis and morphology, soil management, soil physics, environmental modeling, water quality, soil salinity, plant nutrition, soil survey, soil conservation, soil reclamation, soil mineralogy or agricultural climatology and meteorology. 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. 810).

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.

F. Adnan Akyuz, Ph.D.

University of Missouri-Columbia, 1994

Research Area/Activity: Applied Climatology and Microclimatology/Climate Based Agricultural Management

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

Ann-Marie Fortuna, Ph.D.

Michigan State University, 2001

Research Area/Activity: Microbial and soil process regulating nutrient cycling, soil health and global climate change in agricultural and grassland systems. Use of soil health indicators as a measure of the effectiveness of remediation and land management strategies in saline and sodic soils.

David W. Franzen, Ph.D.

University of Illinois, 1993

Research Area/Activity: Soil Fertility/State Soil Specialist

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

Kristine Nichols, Ph.D.

University of Maryland, 2003

USDA-ARS Northern Great Plains Research Laboratory, Mandan, ND

Research Area/Activity: Soil Microbiology and Aggregate Stability

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

Speech Communication

Program and Application Information

Department Chair:

Dr. Mark Meister

Graduate Coordinator:

Dr. Stephenson Beck

Department Location:

Minard Hall 338

Department Phone:

(701) 231-7705

Application Deadline:

March 1 for Fall (Ph.D. only)

Degrees Offered:

Ph.D., M.A., M.S

Test Requirement:	GRE (general required; subject recommended)
English Proficiency Requirements:	TOEFL ibT 100, IELTS 7 for admission; TOEFL ibT114, IELTS 8 for teaching assistantship

Program Description

The graduate program in communication offers graduate study leading to the M.A., M.S., 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. In addition, the M.A. and M.S. degrees are available through online delivery. Information also is available on the department's Web site, www.ndsu.edu/communication.

Admission Requirements

Programs are open to students holding baccalaureate degrees from accredited universities or colleges.

Master of Science or 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; conference paper; final course paper
- Evidence of effective teaching **potential** (please include one or more of the following): teaching evaluations, teaching philosophy statement, recommendation letter(s) may 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 may apply for teaching assistantships at the master's or doctoral degree level. Initially, teaching assistants conduct lab sessions for the Comm 110 class. Teaching assistants may have opportunities to teach other classes during their program. The teaching assistantship deadline is March 1 for the following fall semester.

Graduate assistants receive a stipend and tuition waiver. Applications are available from the department office or online from the department's web site (<https://www.ndsu.edu/communication>). (<http://www.ndsu.edu/communication>)

Master's program

The Master of Arts program is designed for students who are interested in conducting qualitative or rhetorical research, while the Master of Science program is designed for those interested in quantitative research. Both programs require 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
Teaching assistants are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.		
Research Tools		
Select at least two of the following:		
COMM 704	Qualitative Research Methods in Communication	6
COMM 707	Quantitative Research Methods in Communication	

COMM 767	Rhetorical Criticism
SOC 700	Qualitative Methods
SOC 701	Quantitative Methods
STAT 725	Applied Statistics

Students pursuing the M.A. degree must take at least one qualitative methods course (COMM 704, COMM 708, COMM 767, or SOC 700).

Students pursuing the M.S. degree must complete at least one quantitative methods course (COMM 707, COMM 710, SOC 701, or STAT 725).

Elective Specialization

12-15 credits of additional coursework, depending on whether the thesis or paper/project 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 Paper/Project

The paper/project option requires three credits of COMM 797. The thesis requires six credits of COMM 793. 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 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 Scholars courses.

Course Requirements

Minimum of 30 credit hours in core or content concentration:

Code	Title	Credits
Core Courses		
COMM 701	Advanced Research Methods in Communication I	3
COMM 711	Communication Theory	3
COMM 735 or 783	Media and Society or Org Comm Theory Course	3
Teaching assistants, without adequate prior teaching experience, are also required to take COMM 702 - Introduction to College Teaching in their first or second semester.		
Content Concentration		
Minimum of 15 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 Courses		
Exclusive of COMM 701, maximum of 6 credit hours of independent study		6
Dissertation		
Dissertation		15

Comprehensive Exam

When coursework is nearly completed, the DGS 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

Ann Burnett, Ph.D.

University of Utah, 1986

Research Interests: Legal Communication, Small Group Communication, Interpersonal Communication, Gender and Communication

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

Robert S. Littlefield, Ph.D.

University of Minnesota, 1983

Research Interests: Intercultural Communication, Risk and Crisis Communication, Forensic History and Pedagogy

Pamela Lutgen-Sandvik, Ph.D.

Arizona State University, 2005

Research interests: workplace bullying, organizational communication

Zoltan Majdik, Ph.D.

University of Southern California, 2008

Research Interests: Science and Risk Communication in Biotechnological Practice, Rhetorical and Argumentation Theory, Ethics and Moral Theory

Mark Meister, Ph.D.

University of Nebraska, 1997

Research Interests: Rhetorical and Critical Theory, Environmental Communication

Amy O'Connor, Ph.D.

Purdue University, 2004

Research Interests: Organizational Communication, Corporate Advocacy, Public Affairs and Issues Management

Charles Okigbo, Ph.D.

Southern Illinois University, 1982

Research Interests: Social and Behavioral Change Communication, Health Communication

Carrie Anne Platt, Ph.D.

University of Southern California, 2008

Research Interests: Rhetoric of Cultural Politics, Gender and Technology, Media in Society

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

Nan Yu, Ph.D.

Pennsylvania State University, 2009

Research Interests: Health Communication, International Communication

Emeritus

Paul E. Nelson, Ph.D.

University of Minnesota

Judy C. Pearson, Ph.D.
Indiana University

Statistics

Program and Application Information

Department Chair:	Dr. Rhonda Magel
Department Location:	Morrill Hall
Department Phone:	(701) 231-7177
Department Email:	ndsu.stats@ndsu.edu
Application Deadline:	Application deadline is March 15 for international students and applicants who would like an opportunity for an assistantship if available.
Degrees 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 or a master'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, 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. A graduate certificate in Statistics for non majors is also offered.

Admissions Requirements

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. 810), 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.

Graduate Certificate

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.

M.S. Degree 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.

All students must:

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 Linear Models I	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 or STAT 797	Master's Thesis 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 Linear Models I. 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

The program for the M.S. degree in computer science and statistics requires 42 semester credits with an overall GPA of 3.0 or higher. This program is designed with an emphasis in big data analysis. An oral defense of a research-based thesis or paper is required.

All students must:

1. Take a minimum of 42 semester credit hours, including at least 18 graduate course credits in computer science and at least 18 graduate course credits in statistics,
2. Take **CSCI 713** Software Development Processes, **CSCI 724** Survey of Artificial Intelligence, CSCI 732 Introduction To Bioinformatics Introduction to Bioinformatics, **CSCI 765** Introduction To Database Systems and two additional graduate level courses in computer science,
3. Take **STAT 661** Applied Regression Models, STAT 669 Introduction to Biostatistics, **STAT 671** Introduction to the R Language, **STAT 772** Computational Statistics, **STAT 732** Introduction to Bioinformatics, and one additional graduate level course in statistics (does not include STAT 725 Applied Statistics or **STAT 726** Applied Regression and Analysis of Variance),
4. Submit a plan of study at least one semester prior to graduation,
5. Pass a comprehensive exam, and
6. Successfully complete a research-based thesis or paper. The supervisory committee must consist of at least one faculty member from computer science and at least one faculty member from statistics.

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 Linear Models I 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 and MATH 651 Real Analysis II.

- 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.

Ph.D. in Statistics (with Emphasis in Sports Statistics)*

This program requires an additional 30 hours in course work and 30 hours in research beyond M.S. degree. Students entering this program should have an M.S. degree in statistics or closely related field. Any core course required for the M.S. degree must be taken before obtaining the Ph.D. in Statistics (with Emphasis in Sports Statistics). This may require additional coursework beyond the 30 credits depending upon the area in which the degree was obtained. Students in this program must:

Complete the following courses

STAT 663	Nonparametric Statistics
STAT 664	Discrete Data Analysis
STAT 671	Introduction to the R Language
STAT 775	Using Statistics in Sports

Complete 15 credits of electives in graduate statistics courses. At least 12 of these credits must be 700- to 800-level. STAT 725 and STAT 726 will not be counted for this degree program. 15

Successfully complete three 1-credit practicums/internships in sports. Each statistical practicum will be listed as – STAT 794 Practicum/ Internship. 3

- 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 in sports statistics.

*A student that enters this program with an M.S. degree in statistics or closely related field. Previously taken courses will be evaluated to determine their fit into this program.

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

Teacher Education

Program and Application Information

Department Chair:	Dr. William Martin
Coordinator:	Dr. Stacy Duffield
Department Location:	School of Education, FLC 210
Department Phone:	(701) 231-7921
Department Web Site:	www.ndsu.edu/education/
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
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.

Curriculum and Instruction

The program focuses on further development of teacher leaders through study of instructional delivery and enhancement. The program curriculum includes areas of human development, learning, foundations of education, school curriculum, roles of schools and society, and further study in areas of interest. Candidates choosing this option for an M.S. degree must also complete a thesis.

Agricultural Education

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 their advisers if licensure is desired.

Family and Consumer Sciences Education

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 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

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

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.

Social Science 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.

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) 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. Some of the options with unique features are described in more detail below and on the next page.

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.

Admission 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.
2. Pass the Praxis I test of basic skills, meeting ND cut scores in reading, writing and math.

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 Course Requirements

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	
EDUC 798	Master's Thesis	

Teacher Licensure Option

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

Bradley Bowen, Ed.D.

North Carolina State University, 2011

Research Interests: Engineering Education, K-12 Engineering, Project-based Learning

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

Todd F. Lewis, Ph.D.

Kent State University, 2002

Research interests: Addiction Counseling, Motivational Interviewing, Clinical Mental Health Counseling

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

Erika Offerdahl, Bio Chemistry/STEM Education

Warren Olfert, Music Education

Kelly Sassi, English Education

Michael Weber, Music Education

Transportation and Logistics

Program and Application Information

Program Director:

Dr. Denver Tolliver

Assistant to the Director of Educational Programs:

Jody Bohn Baldock

Email:

jody.bohn.baldock@ndsu.edu

Department Location:

Upper Great Plains Transportation Institute

Department Phone:

(701) 231-7938

Department Web Site:

www.ndsu.edu/transportation/tl/

Application Deadline:

March 1 for fall semester, October 1 for spring semester

Degrees Offered:

Ph.D.

Test Requirement:

GRE (GMAT may be substituted)

English Proficiency Requirements:

TOEFL iBT 71; IELTS 6

Program Description

North Dakota State University offers an interdisciplinary program leading to the Ph.D. degree in Transportation and Logistics (TL). The Transportation and Logistics program is a joint effort of the Colleges of Agriculture, Food Systems, and Natural Resources; Business; and Engineering; as well as the Upper Great Plains Transportation Institute. The following departments are participating in the program: Agribusiness and Applied Economics; Civil Engineering; Construction Management and Engineering; Industrial and Manufacturing Engineering; Management and Marketing; Geosciences; and Emergency Management.

The TL doctoral program allows students to develop advanced knowledge and research skills in the rapidly growing fields of transportation and logistics. The Ph.D. program consists of three main components: a core curriculum, an area of concentration, and a dissertation. After completing the interdisciplinary core curriculum, students may enter one of three areas of concentration: 1) Logistics and Supply Chain Systems, 2) Transportation Economics and Regulation, or 3) Transportation Infrastructure and Capacity Planning.

Admission Requirements

The Transportation and Logistics Ph.D. program is open to qualified graduates of universities and colleges of recognized standing. In addition to the Graduate School requirements, the applicant must have adequate preparation in one or more of the disciplines comprising Transportation and Logistics, a stated interest in transportation, and the capability to conduct transportation research.

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.

A student wishing to pursue an area of concentration in Transportation Economics and Regulation must have completed intermediate-level microeconomics and taken at least one course in macroeconomics.

In order to pursue an area of concentration in Logistics and Supply Chain Systems, a student must have earned a baccalaureate degree in Agribusiness, Business, Economics, Finance, Industrial Engineering, Management, Marketing, or a related field. All applicants must meet the general program prerequisites of at least one year of calculus, at least one course in statistics and economics, and an expressed interest in transportation. Preference will be given to students with prior transportation course work and relevant research experience.

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 scholarship 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 qualifying assistantships.

The Ph.D. program requires the completion of a minimum of 90 credits of graduate study beyond the baccalaureate degree with an overall GPA of 3.0 or higher. Each student must develop a plan of study under the guidance of a faculty adviser and a supervisory committee. Twenty-five of the graduate credit hours must consist of core Transportation and Logistics courses or suitable substitutes. A minimum of 30 credit hours must consist of research-based dissertation credits. In addition, a minimum number of credit hours must be taken in the student's area of concentration, including quantitative methods courses related to the concentration. The remaining credits may be comprised of technical electives and additional dissertation credits.

Students must pass the comprehensive/preliminary examination after the majority of the course work has been completed. The comprehensive exam includes written and oral components related to core transportation and quantitative concepts and to the student's area of concentration. The comprehensive exam also includes a dissertation prospectus examination in which the student must present and defend a plan for undertaking and completing a dissertation. After passing of the comprehensive exam and completion of the dissertation, the doctoral candidate must pass a final examination in which the completed dissertation is presented and defended.

Courses Offered

TL 711	Logistics Systems	4
TL 715	Enterprise Resource Planning	3
TL 719	Crisis Analysis and Homeland Security	3
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 725	Technology Advances and Logistics	3
TL 727	Organizational Change Management	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 733	Case Studies in Logistics	3
TL 735	Acquisition Contracts: Law and Management	3
TL 751	Transportation Systems 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	2
TL 756	Transportation Systems Laboratory	3
TL 782	Transportation Systems I	3
TL 783	Transportation Systems II	3
TL 785	Spatial Analysis in Transportation	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	3
TL 811	Modeling for Logistics Research	4

TL 823	Contemporary Supply Chain Research	3
TL 829	Supply Chain Risk Management	3
TL 831	Modeling for Transportation and Logistics Decision Analysis	3
TL 885	Geospatial Information Systems for Transportation	3
TL 790	Graduate Seminar	3
TL 793	Individual Study	3
TL 796	Special Topics	3
TL 899	Doctoral Dissertation	1-15
ENGR 770	Quantitative Modeling	3
ENGR 771	Probabilistic and Deterministic Methods	3
AGEC 771	Economics of Transportation Systems	3
GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3

Canan Bilen-Green, Ph.D.

University of Wyoming, 1998

Research Interests: Quality and Reliability Engineering, Design and Auditing of Quality and Productivity Monitoring Systems, Statistical Modeling and Applications, Applied Operations Research

Department: Industrial and Manufacturing Engineering

John Bitzan, Ph.D.

University of Wisconsin-Milwaukee, 1997

Research Interests: Transportation Economics

Department: Management and Marketing

Alan Dybing, Ph.D.

North Dakota State University, 2013

Research Interests: Asset Management, Energy Impacts, Freight Transportation, Agricultural Transportation, Supply Chain Management, Transportation Economics, Spatial Analysis, Transportation Systems Modeling

Department: Upper Great Plains Transportation Institute

Gokhan Egilmez, Ph.D.

Ohio University, 2012

Research Interests: Problems of Multidisciplinary Domains Including Manufacturing, Supply Chains, Energy, Food & Agriculture, Transportation and Built Environment From Triple Bottom Line (Socio Economic And Environmental) Sustainability Point of View by Using Novel Research Methods Such as Life Cycle Assessment (LCA), Regional, National and Multi Region Input Output Analysis (RIO, NIOA, And MRIO), Data Envelopment Analysis (DEA), System Dynamics (SD), Carbon, Energy, Water and Ecological Footprint Analysis, Multi-Criteria Decision Making, Goal Programming and Fuzzy Set Theory

Department: Industrial and Manufacturing Engineering

Kambiz Farahmand, PhD, PE

University of Texas at Arlington, 1992

Research Interests: Productivity Improvement of Manufacturing Systems, Lean Manufacturing and implementation, Ergonomics, Safety and Human Factors Engineering, Human Exposure and Physiology Simulation, Simulation and Modeling, Facilities and Production Layout Planning, Operations & Materials Logistics Management and Strategic Planning, ISO and QS 9000 standards, and Healthcare Management

Department: Industrial and Manufacturing Engineering

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Department: Agribusiness and Applied Economics

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Department: Agribusiness and Applied Economics

Jill Hough, Ph.D.

University of California-Davis, 2007

Research Interests: Public Transportation, Travel Behavior, Built Environment, Accessibility and Mobility of Seniors

Department: Upper Great Plains Transportation Institute

Ying Huang, Ph.D.

North Dakota State University, 2015

Research Interests: Intelligent Transportation Systems, Pavement and Pipeline Performance Evaluation, Vehicle Identification and Traffic Analysis, Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Applications of Adaptive and Smart Materials, Multi-Hazard Assessment and Mitigation

Department: Civil and Environmental Engineering

Daniel J. Klenow, Ph.D.

North Dakota State University

Research Interests: Social Vulnerability and Functional Needs Populations, Homeland Security and Terrorism, Tornado Vulnerability, Disaster Preparedness, Response, and Recovery

Department: Emergency Management

Won Koo, Ph.D.

Iowa State University, 1974

Research Interests: International Trade

Brenda Lantz, Ph.D.

Pennsylvania State University, 2006

Research Interests: Commercial Vehicle Safety Systems and Analysis, Supply Chain, Intelligent Transportation Systems for Commercial Vehicle Operations, and Statistical Modeling and Diagnostics.

Department: Upper Great Plains Transportation Institute

EunSu Lee, Ph.D.

North Dakota State University, 2011

Research Interests: Transportation Systems Modeling, Informatics, Spatial Analysis, Logistics, Supply Chain Management, Industrial Engineering

Department: Upper Great Plains Transportation Institute

Pan Lu, Ph.D.

North Dakota State University, 2011

Research Interests: Asset Management, Freight Transportation, Statistical Modeling and Applications, Multi-Modal Transportation, Applied Operation Research

Department: Upper Great Plains Transportation Institute

Diomo Motuba, Ph.D.

North Dakota State University, 2009

Research Interests: Transportation Economics, Transportation Systems Modeling, Freight Transportation, Econometrics, Logistics, Supply Chain Management

Department: Upper Great Plains Transportation Institute

Kendall E. Nygard, Ph.D.

Virginia Polytechnic Institute, 1978

Research Interests: Advanced Technologies in Logistics, Optimization Modeling, Simulation Modeling, Data Science and Computational Methods

Department: Computer Science and Operations Research

Peter O'Dour, Ph.D.

University of Missouri-Rolla, 2004

Research Interests: GIS, Groundwater contamination, Remote sensing

Department: Geosciences

David C. Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Impacts of Agricultural Production Methods on the Environment and Natural Resources, Economics of Precision Agriculture Technologies and the Response of Cropping Patterns, Land Use Change to Emerging Biofuels Policy at the Federal Level

Department: Agribusiness and Applied Economics

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Complex Systems and Flexible Manufacturing and Using Linear and Nonlinear Dynamic and Integer Programming and Network Flows

Department: Management and Marketing

Denver D. Tolliver, Ph.D.

Virginia Polytechnic University, 1989

Research Interests: Transportation Systems Planning, Freight Transportation, Economic Analysis

Department: Upper Great Plains Transportation Institute

Rodney D. Traub, Ph.D.

Purdue University, 1994
Field: Operations Management
Department: Management and Marketing

Kim Vachal, Ph.D.

George Mason University, 2005
Research Interests: Policy, Economics, Regional Development
Department: Upper Great Plains Transportation Institute

Amiy Varma, Ph.D.

Purdue University, 1993
Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management
Department: Civil Engineering

David L. Wells, Ph.D.

University of Missouri-Rolla, 1996
Research Interests: International Studies in Manufacturing Technology, Strategic Management, Economic Development Strategies
Department: Industrial and Manufacturing Engineering

William W. Wilson, Ph.D.

University of Manitoba, 1980
Research Interests: Commodity Marketing, Agribusiness, Industrial Organization
Department: Agribusiness and Applied Economics

Frank Yazdani, Ph.D., PE

University of New Mexico, 1987
Research Interests: Structural Engineering/Mechanics, Constitutive Modeling of Materials, Damage Mechanics, Plasticity, Computational Plasticity, Finite Elements, Concrete and Masonry Materials
Department: Civil Engineering

Transportation and Urban Systems

Program and Application Information

Program Director:	Dr. Denver Tolliver
Assistant to the Director of Educational Programs:	Jody Bohn Baldock
Email:	jody.bohn.baldock@ndsu.edu
Department Location:	Upper Great Plains Transportation Institute
Department Phone:	(701) 231-7938
Department Web Site:	www.ndsu.edu/transportation/tus/
Application Deadline:	July 1 for fall semester, December 1 for spring semester
Degrees Offered:	M.S., M.T.U.S., Certificate
English Proficiency Requirements:	TOEFL iBT 71; IELTS 6

Program Description

North Dakota State University offers an interdisciplinary program leading to a Master of Science (M.S.) in Transportation and Urban Systems, a Master of Transportation and Urban Systems (MTUS), and a Certificate in Transportation and Urban Systems. The program is a collaborative effort of several colleges and includes faculty from Agribusiness & Applied Economics; Civil Engineering; Computer Science and Operations Research; Emergency Management; Industrial and Manufacturing Engineering; Management and Marketing; Geosciences; and the Upper Great Plains Transportation Institute.

Master of Science (M.S.) in Transportation and Urban Systems

This degree focuses 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 systems security, and the sustainability of 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 is a non-disquisition degree that is primarily intended for professional planners and engineers. Students in the M.S. and MTUS programs can select from a common set of courses. However, students enrolled in the non-disquisition (MTUS) program have more opportunities for synthesis of practice and additional course work, with less emphasis on research. Students in this option are required to complete a creative component as coordinated with their adviser.

Certificate in Transportation and Urban Systems

The certificate in Transportation & Urban Systems is primarily targeted at practicing professionals who wish to gain additional knowledge in the emerging fields of transportation and urban systems. The certificate requires a minimum of nine (9) course credits that can be selected from a list of online courses, including Transportation Systems Security, Transportation Planning and Environmental Compliance, Transportation System Modeling, Urban Transportation Systems Analysis, Context Sensitive Solutions, Transportation Systems Laboratory, Public Transportation, and Public Transportation II.

Admission Requirements

The Transportation and Urban Systems master's 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 one or more of the disciplines comprising Transportation and Logistics, a stated interest in transportation, the capability to conduct transportation research, and professional experience or interests in community practice.

Students will be accepted from many disciplinary backgrounds, including (but not limited to) architecture, business, civil engineering, environmental engineering or science, geography, government, political science, sociology, and urban affairs. Acceptance is on an individualized basis.

Degree Requirements

Master of Science

A minimum of 30 credits is required for the degree. At least 16 of these credits must be completed using approved courses numbered from 601-689, 691, 700-789. 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 will contribute new models or knowledge. The former may be achieved through the synthesis of several techniques, the modification of existing models, or new applications of analytical techniques to transportation/urban problems. The latter may be accomplished through the collection and analysis of original data or the development of innovative planning techniques. 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.

Master of Transportation and Urban Systems

The Master of Transportation and Urban Systems degree is a non-thesis degree. However, each student must complete a creative component, which can be a case study, practicum, or paper. In the creative component, a student may develop a case study of a metropolitan region, transit system, or public program. Case studies may include: (1) comprehensive transportation planning processes in metropolitan areas, (2) urban transit systems or operations, (3) emergency or disaster response case studies or plans, (4) security programs or issues, and (5) integrated transportation/environmental plans. The case study must be approved by the student's adviser and should involve transportation and community professionals from federal, state, or local agencies, or private industries. In lieu of a case study, the adviser may approve other activities or outcomes that would comprise the creative component.

A minimum of 30 credits is required for the Master of Transportation and Urban Systems degree. At least 21 of these credits must be completed using approved courses numbered from 601-689, 691, 700-789, and 791. A minimum of two (2) credits and a maximum of four (4) credits will be awarded for the creative component.

Certificate Requirements

The certificate in Transportation and Urban Systems will consist of a minimum of nine (9) course credits selected from the list of online courses. At present, this list includes: TL 751 Transportation Systems Security, TL 752 Transportation Planning and Environmental Compliance, TL 753 Transportation System Modeling, TL 754 Urban Transportation Systems Analysis, TL 755 Context Sensitive Solutions, TL 756 Transportation Systems Laboratory, TL 786 Public Transportation I and II. Additional courses may be offered online in the future.

Requirements for the degree will be met by each student formulating their plan of study utilizing the following courses as required.

Core Courses

TL 751	Transportation Systems 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	2
TL 756	Transportation Systems Laboratory	3
TL 786	Public Transportation	3
TL 787	Public Transportation II	3
Electives		
TL 711	Logistics Systems	4
TL 721	International Logistics Management	4
TL 723	Advanced Supply-Chain Planning Across the Enterprise	3
TL 729	Adaptive Planning in Logistics Systems	3
TL 731	Logistics Decision Analysis	3
TL 735	Acquisition Contracts: Law and Management	3
TL 789	Leadership, Ethics, and Academic Conduct in Transportation	1
TL 798	Master's Thesis	3
or TL 797	Master's Paper	

Areas of focus

Spatial Analysis

GEOG 655	Introduction to Geographic Information Systems	4
GEOG 656	Advanced Geographic Information Systems	3
TL 785	Spatial Analysis in Transportation	3

Information Systems Technologies

TL 725	Technology Advances and Logistics	3
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Enterprise Management

TL 715	Enterprise Resource Planning	3
TL 727	Organizational Change Management	3

Transportation Planning

CE 780	Transportation Planning	3
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Emergency Response and Disaster

TL 719	Crisis Analysis and Homeland Security	3
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Canan Bilen-Green, Ph.D.

University of Wyoming, 1998

Research Interests: Quality and Reliability Engineering, Design and Auditing of Quality and Productivity Monitoring Systems, Statistical Modeling and Applications, Applied Operations Research

Department: Industrial and Manufacturing Engineering

John Bitzan, Ph.D.

University of Wisconsin-Milwaukee, 1997

Research Interests: Transportation Economics

Department: Management and Marketing

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Research Interests: Asset Management, Energy Impacts, Freight Transportation, Agricultural Transportation, Supply Chain Management, Transportation Economics, Spatial Analysis, Transportation Systems Modeling

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Gokhan Egilmez, Ph.D.

Ohio University, 2012

Research Interests: Problems of Multidisciplinary Domains Including Manufacturing, Supply Chains, Energy, Food & Agriculture, Transportation and Built Environment From Triple Bottom Line (Socio Economic And Environmental) Sustainability Point of View by Using Novel Research Methods Such as Life Cycle Assessment (LCA), Regional, National and Multi Region Input Output Analysis (RIO, NIOA, And MRIO), Data Envelopment Analysis (DEA), System Dynamics (SD), Carbon, Energy, Water and Ecological Footprint Analysis, Multi-Criteria Decision Making, Goal Programming and Fuzzy Set Theory

Department: Industrial and Manufacturing Engineering

Kambiz Farahmand, PhD, PE

University of Texas at Arlington, 1992

Research Interests: Productivity Improvement of Manufacturing Systems, Lean Manufacturing and implementation, Ergonomics, Safety and Human Factors Engineering, Human Exposure and Physiology Simulation, Simulation and Modeling, Facilities and Production Layout Planning, Operations & Materials Logistics Management and Strategic Planning, ISO and QS 9000 standards, and Healthcare Management

Department: Industrial and Manufacturing Engineering

Robert Hearne, Ph.D.

University of Minnesota, 1995

Research Interests: Natural Resource and Environmental Economics

Department: Agribusiness and Applied Economics

Siew Hoon Lim, Ph.D.

University of Georgia, 2005

Research Interests: Production Economics, Transportation, Industrial Organization

Department: Agribusiness and Applied Economics

Jill Hough, Ph.D.

University of California-Davis, 2007

Research Interests: Public Transportation, Travel Behavior, Built Environment, Accessibility and Mobility of Seniors

Department: Upper Great Plains Transportation Institute

Ying Huang, Ph.D.

North Dakota State University, 2015

Research Interests: Intelligent Transportation Systems, Pavement and Pipeline Performance Evaluation, Vehicle Identification and Traffic Analysis, Structural Health Monitoring/Smart Structures for Transportation Infrastructure, Applications of Adaptive and Smart Materials, Multi-Hazard Assessment and Mitigation

Department: Civil and Environmental Engineering

Daniel J. Klenow, Ph.D.

North Dakota State University

Research Interests: Social Vulnerability and Functional Needs Populations, Homeland Security and Terrorism, Tornado Vulnerability, Disaster Preparedness, Response, and Recovery

Department: Emergency Management

Won Koo, Ph.D.

Iowa State University, 1974

Research Interests: International Trade

Brenda Lantz, Ph.D.

Pennsylvania State University, 2006

Research Interests: Commercial Vehicle Safety Systems and Analysis, Supply Chain, Intelligent Transportation Systems for Commercial Vehicle Operations, and Statistical Modeling and Diagnostics.

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EunSu Lee, Ph.D.

North Dakota State University, 2011

Research Interests: Transportation Systems Modeling, Informatics, Spatial Analysis, Logistics, Supply Chain Management, Industrial Engineering

Department: Upper Great Plains Transportation Institute

Pan Lu, Ph.D.

North Dakota State University, 2011

Research Interests: Asset Management, Freight Transportation, Statistical Modeling and Applications, Multi-Modal Transportation, Applied Operation Research

Department: Upper Great Plains Transportation Institute

Duomo Motuba, Ph.D.

North Dakota State University, 2009

Research Interests: Transportation Economics, Transportation Systems Modeling, Freight Transportation, Econometrics, Logistics, Supply Chain Management

Department: Upper Great Plains Transportation Institute

Kendall E. Nygard, Ph.D.

Virginia Polytechnic Institute, 1978

Research Interests: Advanced Technologies in Logistics, Optimization Modeling, Simulation Modeling, Data Science and Computational Methods

Department: Computer Science and Operations Research

Peter O'Dour, Ph.D.

University of Missouri-Rolla, 2004

Research Interests: GIS, Groundwater contamination, Remote sensing

Department: Geosciences

David C. Roberts, Ph.D.

Oklahoma State University, 2009

Research Interests: Impacts of Agricultural Production Methods on the Environment and Natural Resources, Economics of Precision Agriculture

Technologies and the Response of Cropping Patterns, Land Use Change to Emerging Biofuels Policy at the Federal Level

Department: Agribusiness and Applied Economics

Joseph Szmerekovsky, Ph.D.

Case Western Reserve University, 2003

Research Interests: Project Management and Scheduling, Complex Systems and Flexible Manufacturing and Using Linear and Nonlinear Dynamic and Integer Programming and Network Flows

Department: Management and Marketing

Denver D. Tolliver, Ph.D.

Virginia Polytechnic University, 1989

Research Interests: Transportation Systems Planning, Freight Transportation, Economic Analysis

Department: Upper Great Plains Transportation Institute

Rodney D. Traub, Ph.D.

Purdue University, 1994

Field: Operations Management

Department: Management and Marketing

Kim Vachal, Ph.D.

George Mason University, 2005

Research Interests: Policy, Economics, Regional Development

Department: Upper Great Plains Transportation Institute

Amiy Varma, Ph.D.

Purdue University, 1993

Research Interests: Transportation Systems and Planning, Traffic Engineering, Airports, and Infrastructure Management

Department: Civil Engineering

David L. Wells, Ph.D.

University of Missouri-Rolla, 1996

Research Interests: International Studies in Manufacturing Technology, Strategic Management, Economic Development Strategies

Department: Industrial and Manufacturing Engineering

William W. Wilson, Ph.D.

University of Manitoba, 1980

Research Interests: Commodity Marketing, Agribusiness, Industrial Organization

Department: Agribusiness and Applied Economics

Frank Yazdani, Ph.D., PE

University of New Mexico, 1987

Research Interests: Structural Engineering/Mechanics, Constitutive Modeling of Materials, Damage Mechanics, Plasticity, Computational Plasticity, Finite Elements, Concrete and Masonry Materials

Department: Civil Engineering

Zoology

Program and Application Information

Department Head:	Dr. Wendy Reed
Graduate Coordinator:	Dr. Jenni Momsen
Email:	jennifer.momsen@ndsu.edu
Department Location:	218 Stevens Hall
Department Phone:	(701) 231-7087
Department Web Site:	www.ndsu.edu/biology/
Application Deadline:	Applications must be submitted by January 15 for full consideration for GTA or GRA positions.*
Degrees 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 advisor. For e-mail addresses for faculty members and for 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, Botany, Environmental and Conservation Sciences, Natural Resources Management, and Zoology.

Doctor of Philosophy degrees are available in Botany, Genomics, Cellular and Molecular Biology, Environmental and Conservation Sciences, Natural Resources Management, and Zoology. Advanced work may involve specialized training in the following areas: aquatic biology, behavior, 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, systematics, evolutionary ecology and wildlife biology.

Student research and academic programs are tailored to individual needs and interests. Interdisciplinary approaches to biological problems are encouraged.

Admission Requirements

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 advisor. 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 <http://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 of State Board of Higher Education Scholarships and other 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.

Research Facilities and Equipment

The Department of Biological Sciences occupies approximately 20,000 square feet of floor space in Stevens Hall for research and teaching. 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.

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.

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.

Julia H. Bowsher, Ph.D.

Duke University, 2007

Research Interests: Evolutionary and Developmental Biology of Insects

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

Mark E. Clark, Ph.D.

University of Tennessee, 1996

Research Interests: Fish and Wildlife Ecology, Population Biology, Ecological Modeling, Quantitative Ecology

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

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

Donna L. Jacob, Ph.D.

University College Dublin, 2003

Research Interests: Wetland Science, Biogeochemistry

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

Keith Murphy, Ph.D.

Louisiana State University, 1989

Research Interests: Hereditary Diseases of the Domestic Dog

Erika Offerdahl, Ph.D.

University of Arizona, 2008

Research Interests: Biochemistry and Biology Education Research

Marinus L. Otte, Ph.D.

Vrije Universiteit, 1991

Research Interests: Wetland Science, Biogeochemistry, Plant Ecophysiology

Wendy L. Reed, Ph.D.

Iowa State University, 2000

Research Interests: Physiological Ecology, Evolution of Life Histories, Maternal Effects

Katie M. Reindl, Ph.D.

North Dakota State University, 2006

Research Interests: Cancer Cell Biology, Identification and Validation of New Drug Targets

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

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

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

Laura Aldrich-Wolfe, Ph.D.

Cornell University, 2006

Michael J. Anteau, Ph.D.

Louisiana State University, 2006

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

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

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, for all individuals without regard to age, color, disability, gender expression/identity, genetic information, marital status, national origin, public assistance status, race, religion, sex, sexual orientation, status as a U.S. veteran, or participation in lawful activity off the employer's premises during nonworking hours which is not in direct conflict with the essential business-related interests of the employer.

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://ndusndsugrad.askadmissions.net/emtinterestpage.aspx?ip=application>). The application fee is \$35. You will be prompted to pay the fee when you have completed all of the required fields on 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, a statement of purpose, and a \$35 application fee. If you would like to use any 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 see the additional program-specific application materials (http://www.ndsu.edu/gradschool/prospective_students/additional_requirements/#c97201) link to see if your program has more specific statement requirements.

Official transcripts (transcripts in a sealed, stamped envelope from the granting institution and signed by the school official responsible for issuing such records as the Registrar or Controller of Examinations) of all previous undergraduate and graduate records must be received by the Graduate College

before the application 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. **We do not accept paper letters.** Click on Application Materials (http://www.ndsu.edu/gradschool/prospective_students/additional_requirements/#c97201) for the number of letters required by each program.

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 (http://www.ndsu.edu/gradschool/prospective_students/international_applicants/english_language_score_requirements/#c41215).

Application Deadline

All application materials (http://www.ndsu.edu/gradschool/prospective_students/domestic_applicants/how_to_apply/#c30011) are due one month before registration for U.S. applicants; some programs have earlier deadlines. (See program sections within the Graduate Bulletin for details.)

For international students, the completed application (http://www.ndsu.edu/gradschool/prospective_students/international_applicants/how_to_apply/#c30104) 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 admission decisions by email of action taken on their request for admittance to the Graduate College.

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 from countries where English is the only official language and for students who have recently earned a degree from a U.S. university or college.

Antigua and Barbuda	Jamaica
Australia	Liberia
Bahamas	Mauritius
Barbados	Micronesia (Federated States of)
Bermuda	New Zealand
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	Zambia
Ireland	Zimbabwe

Medical Insurance

International students are required by the North Dakota State Board of Higher Education to purchase the Board approved health insurance policy before they are allowed to register. No other policy may be substituted. The fee for health insurance for one year must be paid upon arrival and at the

beginning of each subsequent year. Because of the increasing costs of health care in the United States, health insurance for a student's spouse and accompanying dependents is highly recommended and is included in the estimate of expenses for accompanying dependents. In addition, the state of North Dakota requires documentation of immunity to measles, mumps, and rubella prior to registration for courses.

Language Proficiency for Teaching Assistants

There will be two recognized categories of teaching assistants:

- Graders are individuals who will have no direct contact with students in their role as a Graduate Teaching Assistant. 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. Individuals may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the criteria presented in the following paragraph.*
- All other GTAs must have a 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.

Domestic GTAs and international GTAs possessing a U.S. 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.

*Full enforcement of this policy awaits the offering of advanced English language courses.

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.

Students admitted under conditional status may, in consultation with their major adviser, request a change to full graduate standing after demonstration of specified capability in graduate studies using the Change of Admission Status form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Change_of_Admission_Status.pdf). This request containing the academic justification for the change is to be made to the Dean of the Graduate College by the major adviser and approved by the program administrator. Eligibility for graduate assistantships will be determined by the program. Students with conditional status cannot become candidates for a degree; they must achieve full graduate standing.

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 complete an application form and submit the appropriate fees. 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. 813)
- Master's Program Policies (p. 816)
- Doctoral Degree Policies (p. 821)
- Graduate Certificate Policies (p. 824)
- Graduate Assistantship Policy (p. 825)
- English Language Proficiency Procedure for Graduate Teaching Assistants (p. 828)
- Graduate Student Appeals Process (p. 829)

General Policies

Scholastic Standards

To be in academic good standing and to receive a graduate degree, a student must have a cumulative grade point average (GPA) of at least 3.0.

All courses taken by a graduate student for which grades are given will be used in calculating the GPA, except 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. Satisfactory or Unsatisfactory is assigned for research credits, and they are not used in calculating the GPA.

In fulfilling graduate course requirements on any plan of study, only grades of A, B, or C are acceptable. For master's paper (797), master's thesis (798), and doctoral dissertation (799/899), only the grade of satisfactory (S) is acceptable. For seminar (790/890), case studies (792/892), individual study/tutorial (793/893), practicum/internship (794/894), or field experience (795/895), only grades of A, B, C, or S are acceptable for graduate credit.

Programs and/or supervisory committees may require a higher performance than C in certain courses. While some courses may be used for graduate credit with a grade of C, courses with grades of D, F, or U may not be used for graduate credit. Acquisition of 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). 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 this one additional semester, 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, or failure to meet professional expectations or standards. 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. 829).

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.

Continuing Education Graduate Courses

Graduate courses administered through the Office of Distance and Continuing Education (DCE) (<http://www.ndsu.edu/dce>) are eligible for graduate degree plans of study if they carry a permanent course number, or the 691/791/891 or 696/796/896 designation. Courses numbered 691/791/891 are trial courses, and course numbered 696/796/896 are special topic courses; courses 691/791/891 are viewed as didactic courses. The 696/796/896 courses can be counted as didactic courses if they are later approved as permanent courses. Courses designed for professional advancement are given the number 600. Although such courses are considered graduate level, they cannot be included on NDSU graduate degree plans of study.

Graduate tuition waivers do not cover DCE courses.

Course instructors must be full or associate members of the NDSU graduate faculty or approved in advance by the administrator of the unit whose course prefix is used, the appropriate academic dean, and the Graduate Dean.

Registration for Research Credit

A student conducting research for the disquisition is to be enrolled in 797, 798, 799 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.

Enrollment Status

Nine credits are considered a full-time graduate load. 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.

Graduate Assistants working 20 hours per week are considered full-time if registered for five or more graduate credits. Federal law requires all international students with a 20-hour per week assistantship to carry at least six graduate credits for full-time status. Graduate students wishing to register for more than 15 credits in a regular semester shall secure the approval of their department chair and the Dean of the Graduate College.

Time Limitations

Graduate credit for any course work that is more than seven (7) calendar years old at the time of the final examination cannot be used to satisfy a master's degree program. The analogous time limitation for a doctoral degree is 10 years.

Following the final examination, the candidate has one (1) year during which to provide the Graduate College a disquisition for which the graduate dean will sign final approval of all requirements for the degree. Should the disquisition not be deposited as specified or any other degree requirements not be completed within this time limit, the student must repeat the final examination.

Continuous Enrollment

Students are required to register for at least one credit each semester (fall and spring) until all degree requirements are completed, including submitting the final copy of a thesis, paper, or dissertation. The graduate dean will not approve the degree until the student has registered for the number of credits of research for any semesters not covered by either registration or leave of absence, but not more than four (4) credits total.

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 maintain continuous enrollment for the fall and/or spring semesters of the absence or obtain a leave of absence, using the Request for Leave of Absence from Graduate Studies form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Leave_of_Absence.pdf).

NOTE: Leaves of absence do not amend in any way the seven and ten-year time limitations.

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 a 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 Programs.

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 Program Policies

Degrees Offered

Master of Arts (M.A.)

Two types of Master of Arts degrees are offered: The Thesis Based Master's or the Comprehensive Study Based Master's. Candidates for the Master of Arts degree will meet the general requirements and those specific requirements in the humanities or social and behavioral sciences. These typically include two years of a foreign language.

Master of Science (M.S.)

North Dakota State University offers master's degrees in three broad categories. Plan A master's includes completion of a thesis including an oral defense. Plan B master's includes an individual creative component other than a thesis and includes an oral defense. Plan C master's includes coursework accompanied by a well-defined culminating experience.

A program need not offer all three types of master's degrees. The types of degrees offered should be justified based on relevant criteria such as pedagogy or principles appropriate to the field. Programs wishing to grant a Master of Science degree or a Master of Arts degree typically need to satisfy the requirements of either the Plan A or the Plan B option. 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.

The Plan A degree requires the completion of a thesis. The thesis would typically include 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 would assemble a supervisory committee as described in the graduate bulletin section titled General Requirements for a Master's Degree. 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 copies of their thesis to the Graduate College as described in the graduate bulletin.

The Plan B degree generally requires a student to develop a thorough understanding of existing knowledge and the ability to apply that existing knowledge to a problem of interest. Under this degree, the student would generate an individual creative component that reflects a solution to the problem. 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 new knowledge created under the Plan B degree need not meet the standard set forth under the Plan A degree. The precise nature of the individual creative component is defined by the program with approval by the Graduate College. Examples of possible creative components include a comprehensive paper, a portfolio, or an integrated field experience. As under the Plan A degree, 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 College. This submission to the Graduate College is to be approved by the student's supervisory committee.

The Plan C degree is designed for degree 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. If a Plan C degree is available, the program must provide to the Graduate College a rationale for the use of the culminating experience and a plan for implementation. Under this degree, 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. 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 coursework and culminating experience, the candidate will be considered to have completed his/her master's degree, and his/her name will be forwarded by the program to the Graduate College. Plan C programs do not require the candidate to submit any other documentation to the Graduate College.

Professional/Non-Thesis Degree Programs

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 MATrg 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 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 courses or through Distance and Continuing Education

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

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 associate member of the graduate faculty.
3. A third member, who could be either a faculty member from outside the student's program or a qualified off-campus expert in the field. If this committee member is not a full or associate member of the graduate faculty, the approval of the Dean of the Graduate College is required. Approval by the dean requires a recommendation from the program administrator accompanied by rationale and a curriculum vitae.

Plan of Study

The Plan of Study shall be appropriate to meet the interests and needs of the student in his or her chosen field as determined by the supervisory committee and approved by the program administrator and the Dean of the Graduate College. The Plan of Study should be submitted to the Graduate College for approval no later than the term immediately after the supervisory committee is formed and must be filed in the Graduate College prior to scheduling the final examination. Revisions may be made later as advisable and necessary, but must be approved by the student, all supervisory committee members, the administrator of the student's program, and the graduate dean.

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 total credits will be determined by each program but must not be less than 30 graduate credits. A student may use up to 10 credits taken as a non-degree NDSU graduate student toward the degree.

For the Thesis Based Masters, of the required minimum 30 graduate credits, at least 16 credits must be approved for graduate credit numbered from 601-689, 691; 700-789, 791; 800-889 and 891 while the research credits (798) must be not fewer than six nor more than 10 credits. Once these minimum requirements have been met, any other graduate courses can be used to satisfy the remaining Plan of Study requirements.

For the Comprehensive Study Based Masters, of the required minimum 30 graduate credits, at least 21 credits must be completed using courses approved for graduate credit numbered from 601-689, 691; 700-789, 791; 800-889 and 891 while the research credits (797) must be not fewer than two nor more than four credits.

The various programs determine which approved graduate courses may be used. For specific requirements, the student should consult the specific programs.

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.

Transfer credits

1. must have been earned from a U.S. or Canadian institution accredited to offer graduate courses and degrees (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.

Time Limitation

Graduate credit for any 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. The final examination is valid for one year. Should a student not have his/her disquisition approved by the Graduate College or fail to meet other degree requirements, the final examination must be retaken.

If a period of time two years or greater lapses before the final copies are submitted, the student must reapply to the Graduate College, re-defend the thesis and must register for a minimum of two (2) credits. Degree date is based on the date when **final** copy is submitted to the Graduate College.

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 nine (9) 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. *A student pursuing multiple graduate degrees must maintain continuous enrollment in each program.*

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.

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 Thesis Based Master's while no more than three of the required 40 credits shall be paper credits under the Comprehensive Study Based Master's. The student is required to conduct interdisciplinary scholarly work culminating in a disquisition acceptable in both major areas.

Thesis Based Degree

Under the guidance of the major adviser, each candidate shall prepare a thesis approved by the administrator of the major program and acceptable to the oral examination committee and to the Dean of the Graduate College. The thesis bearing the approval of the major adviser shall be provided to the examining committee at least seven (7) days before the final oral examination. The candidate shall consult the major adviser regarding the form in which the thesis is to be presented. General instructions on the thesis format are included in the Guidelines for the Preparation of Dissertations, Theses, and Papers. The thesis is the basis for opening the oral examination.

Comprehensive Study Based Degree

This option is offered in certain fields where the candidate may benefit more from a broader range of knowledge than from the preparation of a thesis. The creative component (paper, portfolio, etc.) bearing the approval of the major adviser shall be provided to the examining committee at least seven (7) days before the final oral examination. The creative component must demonstrate ability to do scholarly study appropriate to the major field and present evidence of appropriate written expression. The creative component is the basis for opening the oral examination. General instructions on the format for papers are included in the Guidelines for the Preparation of Dissertations, Theses, and Papers.

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 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 School 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.

Final Examination

The candidate shall pass a final examination (either oral or written as specified for the degree) before being awarded the master's degree. The supervisory committee shall serve as the examining committee of which the major adviser shall serve as chair. Substitutions must be approved by the Dean of the Graduate College.

The final examination shall cover the course work taken by the candidate and also the disquisition, seminar papers, or oral examination paper and knowledge fundamental thereto. The candidate shall prepare for each member of the committee a written statement describing the Plan of Study, i.e., a list of courses, instructors, credits, grades, and dates taken. Permission to schedule the examination must be requested of the Graduate School by the student's major adviser using the Request to Schedule Examination form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Request_to_Schedule_01.pdf). The request to schedule must be received by the Graduate School at least two (2) weeks prior to the examination. The notification by the Graduate College will confirm this scheduled examination.

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 (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Report_of_Final_Examination.pdf) must be filed with the Graduate College within seven (7) days of the exam.

A negative vote by more than one member 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.

Continuous enrollment is required until all degree requirements are completed, including submitting final copies of a thesis, paper, or dissertation. To participate in commencement, the student must have passed the final examination seven days prior to the commencement ceremony.

Filing the Thesis or Paper

After the final examination, the student incorporates into the thesis or paper corrections suggested at the oral examination. Once the corrections are made, the student submits the signed approval page and the IRB/IACUC/IBC Compliance Notification to the Graduate College. The student also makes payment at this time. The disquisition with a second approval page integrated into it is submitted to the Graduate School electronically. After a review process to check for formatting, approval of the final version of the disquisition will be granted by the Graduate Writing Coordinator.

The student will have one (1) year from the date of the final examination to submit the final electronic version of the disquisition and complete all other degree requirements. Should the disquisition not be deposited as specified or any other degree requirements not be completed, the student must retake the final examination and request an extension. If a period of time two 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.

Degree date is based on the date when the **final** copy is submitted to the Graduate College.

Plan of Study

Students in non-thesis/professional programs must submit a Plan of Study by the end of their second semester of course work. Some programs have set curriculum and their own Plan of Study. All Plan of Study forms may be found on the Graduate College website.

The chair of your supervisory committee/adviser must be a full or affiliate member of the graduate faculty.

Master's course work is valid for seven (7) calendar years after a student matriculates. A leave of absence does not change this 7-year time limit.

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.

Transfer credits

1. must have been earned from a U.S. or Canadian institution accredited to offer graduate courses and degrees (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 School.

NOTE: The Special Problem credits of item (6) above are equivalent to NDSU's 696/796/896 Special Topics credits.

Degree Completion

Students in programs not requiring a thesis or paper must complete the Application for Graduate Degree form and submit it to the Graduate College the semester in which the degree will be completed. There is a \$25 processing fee that may be paid online. No transcript or diploma will be issued until this fee is paid.

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 options in Institutional Analysis and 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

Each graduate program will determine whether it will require a language and, if so, the language or languages applicable to the candidate's field of study and the level of reading proficiency required. Low-level proficiency will measure the candidate's comprehension of material in the major field in the foreign language with unlimited use of linguistic reference sources (e.g., dictionaries, glossaries, etc.); high-level proficiency will measure a similar reading comprehension with limited use of such reference sources.

All examinations will be administered under the supervision of the Department of Modern Languages, which will certify the proficiency in the specified foreign language by signing the Ph.D. program of study in the appropriate place. 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.

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, the major adviser, and the Dean of the Graduate College.
2. A second member, who must be a full or associate 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 associate member of the graduate faculty, the approval of the Dean of the Graduate College is required. Approval by the dean requires a recommendation from the program administrator accompanied by rationale and a 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 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. Additionally, the GSR must be clear of any conflicts of interest with either the student or the committee chair/co-chairs (i.e., budgetary relationships, family or financial, personal relationships, or research and/or publication relationships between the GSR and either the student or the committee chair are examples of possible conflicts of interest).

The role of the GSR is to ensure that Graduate College policies are followed, that the expectations for the student's performance are reasonable, that the interactions with the supervisory committee are conducted on a professional basis, and to submit a report to the Graduate College after each examination. 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 matches the defined program outcomes. A list detailing the specific responsibilities of the Graduate College appointee is available [here](#).

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 will be prepared by the student and the major adviser. It shall be approved by the supervisory committee, program administrator, academic dean, and Dean of the Graduate College.

The Plan of Study should be submitted to the Graduate College for approval no later than the term immediately after the supervisory committee is formed and must be filed in the Graduate College prior to scheduling the comprehensive/preliminary examination. Revisions in the program of study must be approved by the student, supervisory committee, program administrator, and Dean of the Graduate College. The graduate dean will officially notify the student, supervisory committee, program administrator, and the academic dean of all changes.

Each program has the responsibility of defining the requirements for a major in its disciplinary area. The total credits will be determined by each program but must not be fewer than 90 semester graduate credits, of which no fewer than 27 credits must be in courses approved for graduate credit numbered 601-689, 691; 700-789, 791; 800-889 and 891 (referred to as didactic courses). Of these 27 credits, no fewer than 15 credits must be in 700 or 800-level course work (700-789, 791, 800-889 and 891).

A student matriculating with a master's degree, including a degree earned at an international institution, must earn no fewer than 60 graduate credits at NDSU. Of these credits, no fewer than 15 credits must be NDSU courses at the 700 or 800 level (700-789, 791, 800-889, and 891). For specific requirements, the student should consult the specific programs.

Transfer of Credit

All graduate credits used to meet the requirements of a doctoral degree must be approved by the supervisory committee, the program administrator, the academic dean, and the Dean of the Graduate College.

The doctorate requires 27 credits of course work, and of these, no more than 12 may be transferred by the petition process.

All transfer credits

1. must carry only grades of A or B on a 4-point scale;
2. must have been earned within a 10-year period at the time of the final examination;
3. must be clearly graduate level (a course listed as both graduate and/or undergraduate level will not be transferred);
4. must not be a continuing education, correspondence, extension, or workshop course;
5. must not be internship, individual study, special problem, or research (disquisition) courses, or courses graded Pass/Fail or Satisfactory/Unsatisfactory;
6. must not have been used to fulfill the requirements of a baccalaureate or master's degree;
7. must be verified by an official transcript; and
8. 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 in item (6) above are equivalent to North Dakota State University 696/796 Special Topic credits.

Time Limitation

Graduate credit for any course work that is more than 10 calendar years old at the time of the final examination cannot be used to satisfy degree requirements. The final examination must be retaken if the final copy of the approved dissertation is not submitted to the Graduate College within one (1) year of the date of the final examination or if any other degree requirements have not been completed within one (1) year of the date of 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 and must register for a minimum of two (2) credits. Degree date is based on the date when **final** copy is submitted to the Graduate College.

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

A comprehensive/preliminary examination will be required of each student after the greater portion of courses has been completed and any required language proficiency has been certified. 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.

Permission to schedule the comprehensive/preliminary and the final oral examinations must be requested. Permission to schedule the examination must be requested of the Graduate College by the student's major adviser using the Request to Schedule Examination form (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Request_to_Schedule_01.pdf). The request to schedule must be received by the Graduate College at least two (2) weeks prior to the examination. The notification by the Graduate College will confirm this scheduled examination.

The examining committee shall consist of the supervisory committee. The dissertation in a near final form must be given to the committee members at least seven (7) days prior to the final examination.

At the conclusion of each oral examination, the examining committee shall record, in writing, its approval or disapproval of the candidate and file its report with the Dean of the Graduate College. The committee's decision filed on the Report of the Final Examination signifies that the student has been examined with respect to the knowledge required in the major area and that all course work has been satisfactorily completed. This form should be filed in the Graduate College within seven (7) days.

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 until all degree requirements are completed, including submitting final copies. To participate in commencement, the student must have passed the final examination.

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 into the dissertation corrections suggested at the oral examination. Once the corrections are made, the student submits the signed approval page (http://www.ndsu.edu/gradschool/graduating_students/dtp/format/approval_page/#c151677) and the IRB/IACUC/IBC Compliance Notification (http://www.ndsu.edu/gradschool/graduating_students/dtp/research/#c150158) to the Graduate College. The student also makes payment (http://www.ndsu.edu/gradschool/graduating_students/dtp/payment/#c151874) at this time. The disquisition with a second approval page integrated into it is submitted to the Graduate College electronically (http://www.ndsu.edu/gradschool/graduating_students/dtp/submit/#c151889). After a review process to check for formatting, approval of the final version of the disquisition will be granted by the Disquisition Processor. The student will have one (1) year from the date of the final examination to submit the final electronic version of the disquisition and complete all other degree requirements. Should the disquisition not be deposited as specified or any other degree requirements not be completed, the student must retake the final examination and request an extension. 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.

Degree date is based on the date when the **final** copy is submitted to the Graduate College.

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. Origination and planning of each will occur within Graduate Certificate program committees hosted by an academic program. Interdisciplinary programs are encouraged, and in such cases, primary contributors will be listed as host programs.

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 (http://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Student_Forms/Add_Certificate.pdf) form available on the Graduate College 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 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 School.
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 in completing a certificate may be used toward the completion of a master's degree.

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.

Approval Process for Graduate Certificate Programs

The approval process will be the same as that of degree programs. The usual supporting documentation is outlined at www.ndsu.edu/facultysenate/acadaffairs/.

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 and fellowships are awarded to graduate students who, based on their credentials, are deemed likely to be highly successful as students. Graduate assistantships contribute to student professional development with the primary purpose of assisting students in the successful completion of their academic program. Activities that are relevant to each student's program of study and contribute to the university's teaching, research/creative activity, or service efforts should be incorporated.

Graduate students attend NDSU for the benefits that come as a result of the educational opportunities we provide in our programs. Graduate assistantships augment those education experiences and provide financial support to help our students focus on their educational goals. It is important

that the student's adviser and program be informed of activities that might impede the student's progress to a degree. 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.

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.

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 for multiple years with annual performance reviews. A general guideline for maximum time allowed is two to three years for master's students and four to five years for doctoral students. Additional time may be approved on a case-by-case basis if the work being accomplished by the student warrants such action.

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

Students must be registered for 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.

Recommendations for assistantships are made to the Dean of the College of Graduate and Interdisciplinary Studies and are subject to the dean's approval. Before any assistantship can be awarded, students must be admitted to the Graduate College as a degree-seeking student. Students placed on Academic Warning may retain their assistantship. Students placed on Probation may no longer receive an assistantship. The tuition waiver may be reduced by other financial awards directed specifically to pay tuition.

Teaching assistants whose native language is not English need to 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.

Expectations of Program/Assistantship Supervisor

Graduate programs may have specific requirements for eligibility. 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 (beginning fall 2015). 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 to assigned 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, as this is likely to negatively affect the ability to maintain adequate progress in meeting degree requirements while fulfilling responsibilities of a full-time assistantship.

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 335.1.

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 be variable 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. You will be responsible for any differential tuition, student fees and tuition for other types of credits taken, such as undergraduate credits, Distance and Continuing Education 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.

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, then 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:
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 bullet below 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 or the PTE Academic.

There will be two recognized categories:

- Graders are individuals who will have no direct contact with students in their role as a Graduate Teaching Assistant. Effective Spring 2011, graders 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, and the PTE Academic equivalent scores are 51 and 56. Individuals may serve in this capacity for no more than one (1) calendar year. To continue as a GTA, students must meet the criteria presented in the bullet below.
- All other GTAs 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 one-year requirement for graders will not be enforced until the offering of advanced English language courses for teaching assistants.

Test Score Requirements

Total Score

	Grader	Teaching Assistant
ibT	79	81
IELTS	6.5	7
PTE Academic	53	54

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 does not discriminate on the basis of age, color, gender expression/identity, genetic information, marital status, national origin, physical and mental disability, pregnancy, public assistance status, race, religion, sex, sexual orientation, or status as a U.S. veteran. Direct inquiries to:

Vice Provost for Faculty and Equity, Old Main, 201 701-231-7708

Title IX/ADA Coordinator, Old Main 102, 701-231-6409

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. Both the "Rights & Responsibilities of Community: A Code of Student Behavior," which is available from the Office of Vice President for Student Affairs, and Section 337 of the NDSU Policy Manual have 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 sequent 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 School. This written notice must be accompanied by the aforementioned documentation and must be received by the Dean of the Graduate School within six weeks of the most recent date on the documentation.

Graduate Student Appeals Committee

The Dean of the Graduate School is responsible for forming graduate student appeals committees and informing the committee members of their duties. The Dean of the Graduate School 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 include 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.

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.

Abdelrahman, Magdy, Associate Professor of Civil and Environmental Engineering

Ph.D., 1996, University of Illinois at Urbana-Champaign

Acevedo, Maricelis, Assistant Professor of Plant Pathology

Ph.D., 2007, University of Nebraska-Lincoln

Akhmedov, Azer, Associate Professor of Mathematics

Ph.D., 2004, Yale University

Alfonseca-Cubero, Maria de los Angeles, Associate Professor of Mathematics

Ph.D., 2003, Universidad Autonoma de Madrid

Aly Ahmed, Bakr, Assistant Professor of Architecture and Landscape Architecture

Ph. D., 2001, Virginia Tech

Ambrosio, Thomas, Professor of Criminal Justice and Political Science

Ph.D. 2000, University of Virginia

Andersen, Margaret, Professor of Accounting, Finance and Information Systems

Ph.D., 1989, Indiana University

Arnold, Lisa, Assistant Professor of English

Ph.D., 2011, University of Louisville

Archbold, Carol, Professor of Criminal Justice and Political Science

Ph.D., 2002, University of Nebraska-Omaha

Asa, Eric, Associate Professor of Construction Management and Engineering

Ph.D., 2000, University of Alberta

Asperin, Amelia Adora Estepa, Associate Professor of Apparel, Design and Hospitality Management

Ph.D., 2007, Kansas State University

Axelson, Rick, Associate Professor of Sociology and Anthropology

Ph.D., 2003, University of Arizona

Ayebo, Abraham, Assistant Professor of Mathematics

Ph.D., 2010, University of Nevada

Azarmi, Fardad, Associate Professor of Mechanical Engineering

Ph.D., 2008, University of Toronto

Baggett, Ashley, Assistant Professor of History, Philosophy and Religious Studies

Ph.D., 2014, Louisiana State University

Bahrani, Bahman, Professor of Management and Marketing

Ph.D., 1983, University of Nebraska-Lincoln

Bai, Yong, Professor of Construction Management and Engineering

Ph.D., 1996, North Carolina State University

Bajwa, Dilpreet, Associate Professor of Mechanical Engineering

Ph.D., 2000, University of Illinois at Urbana-Champaign

Bajwa, Sreekala, Professor of Agricultural and Biosystems Engineering

Ph.D., 2000, University of Illinois at Urbana-Champaign

Balas, Benjamin, Assistant Professor of Psychology

Ph.D., 2007 Massachusetts Institute of Technology

Banerjee, Somnath, Assistant Professor of Management and Marketing

Ph.D., 2015, University of Central Florida

Barabanov, Nikita, Professor of Mathematics

Ph.D., 1979, Leningrad University

Barnhart, Thomas, Professor of Health, Nutrition and Exercise Sciences

Ph.D., University of New Mexico

Barrett, Tracy, Associate Professor of History, Philosophy and Religious Studies

Ph.D., 2007, Cornell University

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Ph.D., 1981, Oklahoma State University

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Ph.D., 2004, University of Eastern Finland

Pharm.D., 2003, Charles University

Marx, Adam A., Assistant Professor, School of Education

Ph.D., 2014, University of Missouri

May, Sylvio, Associate Professor of Physics

Ph.D., 1996, Friedrich-Schiller University

Maylath, Bruce, Professor of English

Ph.D., 1994, University of Minnesota

McCaul, Kevin D, Professor of Psychology

Ph.D., 1978, University of Kansas

McClellan, Phillip E., Professor of Plant Sciences

Ph.D., 1982, Colorado State University

McCourt, Mark E., Professor of Psychology

Ph.D., 1982, University of California-Santa Barbara

McEvoy, John, Associate Professor of Veterinary and Microbiological Sciences

Ph.D., 2002, University of Ulster

McGeorge, Christine, Professor of Human Development and Family Sciences

Ph.D., 2005, University of Minnesota

McGinnis, Esther, Assistant Professor of Plant Sciences

Ph.D., 2013, University of Minnesota

McGranahan, Devan, Assistant Professor of Range Sciences

Ph.D., 2011, Iowa State University

McKee, Gregory, Associate Professor of Agribusiness and Applied Economics

Ph.D., 2006 University of California, Davis

McMullen, Michael S., Professor of Plant Sciences

Ph.D., 1976, University of Minnesota

McPhee, Kevin, Professor of Plant Sciences

Ph.D., 1995, University of Idaho

Meehan, Miranda, Assistant Professor of Animal Sciences

Ph.D., 2011, North Dakota State University

Meinhardt, Steven W., Associate Professor of Plant Pathology

Ph.D., 1984, University of Illinois

Meister, Mark Andrew, Professor of Communication

Ph.D., 1997, University of Nebraska

Mergoum, Mohamed, Professor of Plant Sciences

Ph.D., 1991, Colorado State University

Miljkovic, Dragan, Professor of Agribusiness and Applied Economics

Ph.D., 1996, University of Illinois at Urbana-Champaign

Miller, Donald R., Professor of Pharmacy Practice

Pharm.D., 1978, University of Michigan

Miller, E. John, Professor of Music

Ph.D., 1991, Northwestern University

Miller, Jo Ann, University Distinguished Professor of Music

D.M.A., 1989, Conservatory of Music, University of Cincinnati College

Moe, Charlette, Assistant Professor of Music

D.M.A., North Dakota State University

Momsen, Jennifer, Assistant Professor of Biological Sciences

Ph.D., 2007, Rutgers University

Montplaisir, Lisa M., Associate Professor of Biological Sciences

Ph.D., 2003, University of Arizona

Murphy, Keith, Professor of Biological Sciences

Ph.D., 1989, Louisiana State University

Myer, Andrew, Assistant Professor of Criminal Justice and Political Science

Ph.D., 2010, University of Cincinnati

Napoleon, Larry, Assistant Professor, School of Education

Ph.D., 2009, The Pennsylvania State University

Naughton, Cynthia, Associate Professor of Pharmacy Practice

Pharm.D., 1995 North Dakota State University

Nawarathna, Dharmakeerthi, Assistant Professor of Electrical and Computer Engineering

Ph.D., 2005, University of Houston

Nawrot, Mark, Professor of Psychology

Ph.D., 1991, Vanderbilt University

Nelson, Berlin D., Professor of Plant Pathology

Ph.D., 1979, Washington State University

Nelson, Jill, Associate Professor, School of Education

Ph.D., 1993, University of Wisconsin

Nelson, Kjersten, Assistant Professor of Criminal Justice and Political Science

Ph.D., 2009, University of Minnesota

Newman, David, Assistant Professor of Animal Sciences

Ph.D., 2009, North Dakota State University
Nganje, William, Professor Agribusiness and Applied Economics
Ph.D., 1999, University of Illinois
Noone, Katherine, Assistant Professor of Music
D.M.A., North Dakota State University
Norland, Jack, Associate Professor of Natural Resources Sciences
Ph.D., 2008, North Dakota State University
Novozhilov, Artem, Assistant Professor of Mathematics
Ph.D., 2002, Moscow State University of Communication Means
Nyachwaya, James, Assistant Professor, School of Education and Chemistry & Biochemistry
Ph.D., 2012, University of Minnesota Twin Cities
Nygard, Kendall E., Professor of Computer Science
Ph.D., 1978, Virginia Polytechnic Institute and State University
O'Connor, Melissa, Assistant Professor of Human Development and Family Sciences
Ph.D., 2010, University of South Florida
Oduor, Peter Associate Professor of Geosciences
Ph.D., 2004, University of Missouri at Rolla
Offerdahl, Erika, Associate Professor of Chemistry and Biochemistry
Ph.D., 2008, University of Arizona
Okigbo, Charles, Professor of Communication
Ph.D., 1983, Southern Illinois University
Olfert, Warren, Associate Professor of Music
Ph.D., 1992, Florida State University
Olson, Frayne, Associate Professor of Agribusiness and Applied Economics
Ph.D., 2007, University of Missouri
O'Rourke, Stephen T., Professor of Pharmaceutical Sciences
Ph.D., 1985, University of Wisconsin
Orr, Megan, Assistant Professor of Statistics
Ph.D., 2012, Iowa State University
Osorno, Juan, Associate Professor of Plant Sciences
Ph.D., 2006, North Dakota State University
Otte, Marius, Professor of Biological Sciences
Ph.D., 1991, Vrije Universiteit
Pace, Chelsea, Assistant Professor of Theatre Arts
M.F.A., Arizona State University
Padmanabhan, G., Professor of Civil and Environmental Engineering
Ph.D., 1980, Purdue University
Parent, Alexander, Assistant Professor of Chemistry and Biochemistry
Ph.D., 2013, Yale University
Park, Jeongdo, Assistant Professor of Apparel, Design and Hospitality Management
Ph.D., 2014, Washington State University
Park, Kwangsoo, Assistant Professor of Apparel, Design and Hospitality Management
Ph.D., 2013, Temple University
Pasche, Julie, Assistant Professor of Plant Pathology
Ph.D., 2012, North Dakota State University
Patnode, Matthew, Associate Professor of Music
D.M.A., 1999, Arizona State University
Pemstein, Daniel, Assistant Professor of Criminal Justice and Political Science
Ph.D., 2010, University of Illinois
Pengnate, Supavich, Assistant Professor of Accounting, Finance and Information Systems
Ph.D., 2013, Oklahoma State University
Pepple, Kathleen, Assistant Professor Architecture and Landscape Architecture
M.F.A., 1981, University of North Dakota
Perrizo, William, University Distinguished Professor of Computer Science
Ph.D., 1972, University of Minnesota
Peters, Thomas, Assistant Professor of Plant Science
Ph.D., 1990, North Dakota State University
Petersen, Michael, Assistant Professor of Accounting, Finance and Information Systems
Ph.D. 2002, The University of Iowa
Peterson, Claudette, Assistant Professor, School of Education
Ed.D., 2006, Oklahoma State University
Peterson, Larry R., Professor of History, Philosophy and Religious Studies

Ph.D., 1978, University of Minnesota

Peterson, Tim, Professor of Management and Marketing

Ph.D., Texas A & M University at College Station

Petry, Timothy A., Associate Professor of Agribusiness and Applied Economics

M.S., 1973, North Dakota State University

Pieri, Robert V., Professor of Mechanical Engineering

Ph.D., 1987, Carnegie-Mellon University

Platt, Carrie Ann, Associate Professor of Communication

Ph.D., 2008, University of Southern California

Pruess, Birgit, Associate Professor of Veterinary and Microbiological Sciences

Ph.D., 1991, Ruhr-Universität Bochum, Germany

Pryor, Scott, Associate Professor of Agricultural and Biosystems Engineering

Ph.D., 2005, Cornell University

Qian, Steven, Associate Professor of Pharmaceutical Sciences

Ph.D., 1999, University of Iowa

Rafert, Bruce, Professor of Physics

Ph.D., 1978, University of Florida

Rahman, Md Mukhlesur, Assistant Professor of Plant Sciences

Ph.D., 2007, University of Manitoba

Rahman, Shafiqur, Associate Professor of Agricultural and Biosystems Engineering

Ph.D., 2004, University of Manitoba

Ramamoorthy, Sheela, Assistant Professor of Veterinary and Microbiological Sciences

Ph.D., 2006, Virginia Tech

Ramsay, Ronald L. M., Associate Professor of Architecture and Landscape Architecture

M.Arch., 1991, University of Texas-Austin

Randall, Brandy, Associate Professor of Human Development and Family Science

Ph.D., 2002, University of Nebraska, Lincoln

Ransom, Joel K., Professor of Plant Sciences

Ph.D., 1982, University of Minnesota

Rasmussen, Jack B., Professor of Plant Pathology

Ph.D., 1987, Michigan State University

Rasmussen, Seth C., Professor of Chemistry and Biochemistry

Ph.D., 1994, Clemson University

Ray, Chris, Assistant Professor, School of Education

Ph.D., 2007, Oklahoma State University

Ray-Degges, Susan, Associate Professor of Apparel, Design and Hospitality Management

M.S., 1987, University of Missouri

Redmer, Dale A., Professor of Animal Sciences

Ph.D., 1983, University of Missouri

Reed, Wendy, Professor of Biological Sciences

Ph.D., 2000, Iowa State University

Reindl, Katie, Assistant Professor of Biological Sciences

Ph.D., 2006, North Dakota State University

Reynolds, Lawrence P., University Distinguished Professor of Animal Sciences

Ph.D., 1983, Iowa State University

Rhee, Yeong, Professor of Health, Nutrition and Exercise Sciences

Ph.D., 1999, Oklahoma State University

Rider, David A., Professor of Entomology

Ph.D., 1988, Louisiana State University

Riggins, Frederick, Associate Professor of Management Information Systems

Ph.D., 1994 Carnegie-Mellon University

Ringwall, Kris, Associate Professor of Animal Sciences

Ph.D., Oklahoma State University

Ripplinger, David, Assistant Professor of Agribusiness and Applied Economics

Ph.D., 2012, North Dakota State University

Roberts, David, Assistant Professor of Agribusiness and Applied Economics

Ph.D., 2009, Oklahoma State University

Robinson, Andrew, Assistant Professor of Plant Sciences

Ph.D., 2012, Purdue University

Robinson, Michael D., Professor of Psychology

Ph.D., 1996, University of California, Davis

Rodgers, Kenton R., Professor of Chemistry and Biochemistry

Ph.D., 1988, University of Iowa
Rogers, David A., Professor of Electrical and Computer Engineering
Ph.D., 1971, University of Washington
Rokke, Paul D., Professor of Psychology
Ph.D., 1985, University of Houston
Roumell, Elizabeth, Assistant Professor in the School of Education
Ph.D., 2009, University of Wyoming
Routledge, Clay, Associate Professor of Psychology
Ph.D., 2005, University of Missouri-Columbia
Rupiper Taggart, Amy, Professor of English
Ph.D., 2001, Texas Christian University
Saini-Eidukat, Bernhardt, Associate Professor of Geosciences
Ph.D., 1991, University of Minnesota
Salajan, Florin, Assistant Professor, School of Education
Ed.D., 2007, Columbia University
Salem, Saeed, Associate Professor of Computer Science
Ph.D., 2009, Rensselaer Polytechnic Institute
Sanders, Gregory F., Professor of Human Development and Family Science
Ph.D., 1983, University of Georgia
Sandstrom, Kent, Professor of Sociology/Anthropology
Ph.D., 1994, University of Minnesota
Sassi, Kelly, Associate Professor of English
Ph.D., 2008, University of Michigan
Saxowsky, David, Associate Professor of Agribusiness and Applied Economics
J.D., 1979, The Ohio State University
Scherer, Thomas S., Associate Professor of Agricultural and Biosystems Engineering
Ph.D., 1986, University of Minnesota
Schnell, R. Craig, Professor of Pharmaceutical Sciences
Ph.D., 1969, Purdue University
Schroeder, Jerome W., Associate Professor of Animal Sciences
Ph.D., 1999, North Dakota State University
Schuh, Jane, Associate Professor of Veterinary and Microbiological Sciences
Ph.D., 2000, North Dakota State University
Schwaen, Regin, Associate Professor of Architecture and Landscape Architecture
M.Arch., 1992, Arkitektkskoloni. Aarhus / Licensed Architect M.A.A.
Schwarz, Paul B., Professor of Plant Sciences
Ph.D., 1987, North Dakota State University
Scott, David, Professor of Pharmacy Practice
Ph.D. 1987, University of Minnesota
Secor, Gary A., Professor of Plant Pathology
Ph.D., 1978, University of California-Davis
Secor-Turner, Molly, Associate Professor of Nursing
Ph.D., 2008, University of Minnesota
Sedivec, Kevin K., Professor of Natural Resource Sciences
Ph.D., 1994, North Dakota State University
Selekwa, Majura, Associate Professor of Mechanical Engineering
Ph.D., 2001, Florida A and M University
Sengupta, Indranil, Assistant Professor of Mathematics
Ph.D., 2010, Texas A & M University
Shaik, Saleem, Associate Professor of Agribusiness and Applied Economics
Ph.D., 1998, University of Nebraska, Lincoln
Shen, Gang, Assistant Professor of Statistics
Ph.D., 2009, Purdue University
Shetty, Kalida, Professor of Plant Sciences
Ph.D., 1989, University of Idaho
Shume, Teresa, Assistant Professor, School of Education
Ph.D., 2013, University of North Dakota
Sibi, Mukund P., University Distinguished Professor of Chemistry and Biochemistry
Ph.D., 1980, City University of New York
Simsek, Halis, Assistant Professor of Agricultural and Biosystems Engineering
Ph.D., North Dakota State University
Simsek, Senay, Associate Professor of Plant Sciences

Ph.D., 2006, Purdue University

Singh, Jagdish, Professor of Pharmaceutical Sciences

Ph.D., 1982, Banaras Hindu University, Varanasi, India

Sinha, Sangita, Associate Professor of Chemistry and Biochemistry

Ph.D., 2000, Purdue University

Sirotiak, Todd, Associate Professor of Construction Management & Engineering

Ph.D., 2008, Iowa State University

Slator, Brian, Professor of Computer Science

Ph.D., 1988, New Mexico State University

Smith, Angela, Assistant Professor of History, Philosophy and Religious Studies

Ph.D., Middle Tennessee University

Smith, Gary, Professor of Construction Management & Engineering

Ph.D., 1986, Purdue University

Smith, Scott, Professor of Electrical & Computer Engineering

Ph.D., 2001, University of Central Florida

Snyder, Herbert, Professor of Accounting, Finance and Information Systems

Ph.D., 1994, Syracuse University

Song, Jongchul, Assistant Professor of Construction Management and Engineering

Ph.D., 2005, University of Texas Austin

Srinivasan, Sudarshan, Associate Professor of Electrical and Computer Engineering

Ph.D., 2007, Georgia Institute of Technology

Srivastava, D. K., Professor of Chemistry and Molecular Biology

Ph.D., 1980, Banaras Hindu University

Srivastava, Malini, Assistant Professor of Architecture and Landscape Architecture

M.Arch., 1998, University of Minnesota

Stastny, Sherri, Associate Professor of Health, Nutrition and Exercise Sciences

Ph.D., 2007, North Dakota State University

Steele, Dean D., Associate Professor of Agricultural and Biosystems Engineering

Ph.D., 1991, University of Minnesota

Steffen, Kristine, Associate Professor of Pharmaceutical Sciences

Ph.D., 2007, North Dakota State University

Stevens, Charles D., Professor of Management and Marketing

Ph.D., 1998, University of Kansas

Stickney, Gwen, Associate Professor of Modern Languages

Ph.D., 2004, Indiana University

Stockwell, Craig A., Associate Professor of Biological Sciences

Ph.D., 1995, University of Nevada-Reno

Stokka, Gerald, Associate Professor of Animal Sciences

DVM, 1982, Iowa State University

Stone, Matthew, Assistant Professor of Construction Management and Engineering

Ph.D., 2013, University of Alabama

Strand, Bradford, Professor of Health, Nutrition and Exercise Sciences

Ph.D., 1988, University of New Mexico

Strand, Mark, Professor of Pharmacy Practice

Ph.D., 2004, University of Colorado at Denver

Strand, Michael, Professor of Visual Arts

M.F.A., 1999, University of Nebraska

Striker, Jessica, Assistant Professor of Mathematics

Ph.D., 2008, University of Minnesota

Sublett, Virginia, Professor of Music

D.M.A., 1997, University of California, San Diego

Sullivan, Dale, Professor of English

Ph.D., 1988, Rensselaer Polytechnic Institute

Sun, Chengwen, Associate Professor of Pharmaceutical Sciences

Ph.D., 1996, Norman Bethune University of Medical Sciences

Sun, Wenfang, Professor of Chemistry and Biochemistry

Ph.D., 1995, Institute of Photographic Chemistry, Chinese Academy of Sciences

Suzen, Yildirim, Associate Professor of Mechanical Engineering

Ph.D., 1998, Wichita State University

Swanson, Kendall, Professor of Animal Sciences

Ph.D., 2000, University of Kentucky

Swenson, David, Associate Professor of Visual Arts

M.F.A., 1992, University of Minnesota

Sweetman, Jon, Assistant Professor of Biological Sciences

Ph.D., 2006, Queens University

Szmerekovsky, Joseph G., Professor of Management and Marketing

Ph.D., 2003, Case Western Reserve University

Tackett, Lydia, Assistant Professor of Geosciences

Ph.D., 2014, University of Southern California

Tangen, Jodi, Assistant Professor, School of Education

Ph.D., 2015, University of North Carolina at Greensboro

Tangpong, Chanchai, Professor of Management and Marketing

Ph.D., 2002, Southern Illinois University, Carbondale

Tangpong, Xiangqing, Associate Professor of Mechanical Engineering

Ph.D., 2006, Carnegie-Mellon University

Terbizan, Donna J., Professor of Health, Nutrition, and Exercise Science

Ph.D., 1982, The Ohio State University

Theile, Verena, Associate Professor of English

Ph.D., 2006, Washington State University

Thomas, Laura, Assistant Professor of Psychology

Ph.D., 2008, University of Illinois at Urbana-Champaign

Thompson, Asunta L., Associate Professor of Plant Sciences

Ph.D., 1998, University of Idaho

Thompson, Kevin M., Professor of Criminal Justice and Political Science

Ph.D., 1986, University of Arizona

Tian, Ruilin, Associate Professor of Management and Marketing

Ph.D., 2008, Georgia State University

Totten, Gary, Associate Professor of English

Ph.D., 1998, Ball State University

Traub, Rodney D., Associate Professor of Management and Marketing

Ph.D., 1994, Purdue University

Travers, Steven, Associate Professor of Biological Sciences

Ph.D., 1998, University of California, Santa Barbara

Troop, Wendy, Associate Professor of Psychology

Ph.D., 2002, University of Illinois at Urbana-Champaign

Ubhaya, Vasant, Professor of Computer Science

Ph.D., 1971, University of California-Berkeley

Ulven, Chad, Associate Professor of Mechanical Engineering

Ph.D., 2005, University of Alabama, Birmingham

Ungar, Abraham, Professor of Mathematics

Ph.D., 1973, Tel-Aviv University

Urness, Cindy, Associate Professor of Architecture and Landscape Architecture

M.Arch., 1988, Pratt Institute

Varland, Rooth, Associate Professor of Theater Arts

M.F.A., 1989, Northwestern University

Varma, Amiy, Associate Professor of Civil and Environmental Engineering

Ph.D., 1993, Purdue University

Vettern, Rachele, Associate Professor of Animal Sciences

Ph.D., 2006, North Dakota State University

Vogiatzis, Chrysafis, Assistant Professor of Industrial and Manufacturing Engineering

Ph.D., 2014, University of Florida

Voldseth, Deirdre, Associate Professor of Entomology

Ph.D., 2005, Washington State University

Vonnahme, Kimberly, Associate Professor of Animal Sciences

Ph.D., 2003, University of Wyoming

Vorderbruggen, Joan, Assistant Professor of Architecture and Landscape Architecture

M.Arch, 2009, University of Oregon

Voronov, Andriy, Associate Professor of Coatings and Polymeric Materials

Ph.D., 1994, Lviv Polytechnic Institute, Lviv, Ukraine

Wachenheim, Cheryl J., Professor of Agribusiness and Applied Economics

Ph.D., 1994, Michigan State University

Wageman, Justin J., Associate Professor, School of Education

Ph.D., 1999, University of North Dakota

Wagner, C., Alexander, Associate Professor of Physics

Ph.D., 1997, Oxford University

Wagner, Sarah, Associate Professor of Animal Sciences

Ph.D., 2003, Iowa State University

D.V.M., 1994, Michigan State University

Wahl, Thomas, Professor of Agribusiness and Applied Economics

Ph.D., 1989, Iowa State University

Walden, Justin, Assistant Professor of Communication

Ph.D., 2013, Penn State University

Walia, Gurisimran Singh, Associate Professor of Computer Science

Ph.D., 2009, Mississippi State University

Wang, Jinhui, Assistant Professor of Electrical and Computer Engineering

Ph.D., 2006, University of Rochester and Beijing University of Technology

Wang, Xinnan, Assistant Professor of Mechanical Engineering

Ph.D., 2008, University of South Carolina

Wang, Yechun, Associate Professor of Mechanical Engineering

Ph.D., 2007, University of Maryland at College Park

Ward, Alison, Assistant Professor of Animal Science

Ph.D., 2011, University of Saskatchewan

Warne, Donald, Associate Professor of Public Health

M.D., 1995, Stanford University School of Medicine

Weber, Christina, Associate Professor of Sociology and Anthropology

Ph.D., 2005, State University of New York, Buffalo

Weber, Michael, Professor of Music

D.M.A., 1990, University of Arizona

Webster, Dean, Professor of Coatings and Polymeric Materials

Ph.D., 1984, Virginia Polytechnic Institute and State University

Wells, David L., Professor of Industrial and Manufacturing Engineering

Ph.D., 1996, University of Missouri-Rolla

West, Todd Patrick, Associate Professor of Plant Sciences

Ph.D., 2004, Southern Illinois University

Westerman, David, Assistant Professor of Communication

Ph.D., 2007, Michigan State University

Whitsel, Chris, Assistant Professor of Sociology and Anthropology

Ph.D., 2009, Indiana University

Wick, Abbey, Assistant Professor of Natural Resource Sciences

Ph.D., 2007, University of Wyoming

Wicktor, Emily, Assistant Professor of English

Ph.D., 2010, University of Kansas

Wiesenborn, Dennis P., Professor of Agricultural and Biosystems Engineering

Ph.D., 1989, Rice University

Wilkinson, John, Assistant Professor of Chemistry and Biochemistry

Ph.D., 2001, Vanderbilt University

Wilson, William W., University Distinguished Professor of Agribusiness and Applied Economics

Ph.D., 1980, University of Manitoba

Wischer, Stephen, Associate Professor of Architecture and Landscape Architecture

M. Arch., 2004, University of Calgary

M.F.A., 2004, University of Calgary

Wolf-Hall, Charlene, Professor of Veterinary and Microbiological Sciences

Ph.D., 1995, University of Nebraska-Lincoln

Wood, Nathan, Associate Professor, School of Education

Ph.D., 2006, University of Minnesota

Wood, Scott A., Professor of Geosciences

Ph.D., 1985, Princeton University

Woods, Rebecca, Associate Professor of Human Development and Family Science

Ph.D., 2006, Texas A & M University

Wottrich, Tyler, Assistant Professor of Music

D.M.A., Stony Brook University

Wright, Mary, Associate Professor of Nursing

Ph.D., 1988, University of Texas at Austin

Wright, Newell, Professor of Management and Marketing

Ph.D., Virginia Tech

Wu, Xiangfa, Associate Professor of Mechanical Engineering

Ph.D., 2003, University of Nebraska

Yadav, Om Prakash, Professor of Industrial and Manufacturing Engineering

Ph.D., 2002, Wayne State University

Yan, Changhui, Associate Professor of Computer Science

Ph.D., 2005, Iowa State University

Yan, Guiping, Assistant Professor of Plant Pathology

Ph.D., Washington State University

Yang, Huojun, Assistant Professor of Construction Management and Engineering

Ph.D., 2012, University of Nebraska-Lincoln

Yang, Mijia, Assistant Professor of Civil and Environmental Engineering

Ph.D., 2006, University of Akron

Yang, Yarong, Assistant Professor of Statistics

Ph.D., 2010, Northern Illinois University

Yang, Zhongyu, Assistant Professor of Chemistry and Biochemistry

Ph.D., 2010, University of Pittsburgh

Yazdani, Frank, Professor of Civil and Environmental Engineering

Ph.D., 1987, University of New Mexico

Yellow Bird, Michael J., Professor of Sociology and Anthropology

Ph.D., 1994, University of Wisconsin-Madison

Young, Alex, Assistant Professor of Accounting, Finance and Information Systems

Ph.D., 2015, Duke University

Yu, Nan, Associate Professor of Communication

Ph.D., 2009, Penn State University

Zhang, Lei, Assistant Professor of Agribusiness and Applied Economics

Ph.D., 2011, University of Texas at Dallas

Zhang, Limin, Assistant Professor of Accounting, Finance and Information Systems

Ph.D., 2006, University of Arizona

Zhang, Qi, Associate Professor of Plant Sciences

Ph.D., 2007, Kansas State University

Zhang, Wei, Associate Professor of Accounting, Finance & Information Systems

Ph.D., 2001, Syracuse University

Zhang, Yan, Assistant Professor of Mechanical Engineering

Ph.D., 2013, Iowa State University

Zhao, Pinjing, Associate Professor of Chemistry and Biochemistry

Ph.D., 2003, Cornell University

Zhong, Shaobin, Assistant Professor of Plant Pathology

Ph.D., 2000, North Dakota State University

Ziejewski, Mariusz, Professor of Mechanical Engineering

Ph.D., 1986, North Dakota State University

Zollinger, Richard K., Professor of Plant Sciences

Ph.D., 1987, Michigan State University

Zuber, Jill, Assistant Professor of Accounting & Information Systems

Ph.D., 2007, University of Arkansas

Zuk, Alan J., 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 (https://www.ndsu.edu/fileadmin/gradschool.ndsu.edu/Forms/Faculty_Staff_Documents/Affiliate_Faculty.pdf) form and a current curriculum vita. 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 to 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
- Serve on committees for all students
- Teach graduate courses

Criteria

- Terminal degree
- Sustained record of scholarly and/or creative accomplishment
- 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

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 School. Waivers are granted for one academic year and may be renewed twice at the discretion of the Dean of the Graduate College.

Course Catalog Descriptions

- Course Definitions, Designators, and Format (p. 852)
- Course Descriptions (p. 854)

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 (<http://www.ndsu.edu/bisonconnection/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. 854). 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 - open to freshmen¹
- 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
- 600 numbered courses - Continuing Education post-baccalaureate courses, not applicable toward graduate degrees
- 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

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.

¹ Any 100-level course offered for non-degree credit is noted in the course description.

Uniform Course Numbers

The following courses may be offered by departments but are described here because of their uniform numbers and descriptions.

(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

Study Abroad, 1-15

Pre-arranged study at accredited foreign institutions or in approved study abroad programs. *Prereq:* Sophomore standing and prior approval by major department. Graded 'P' or 'F' or 'S' or 'U'.

(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, 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

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.

(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) 379

Study Tour Abroad, 1-6

NDSU faculty directed, part-term experience or field study in a foreign country. Conducted in English for residence credit. *Prereq:* Prior approval by the Office of International Programs and major department. May be repeated. Graded 'P' or 'F'.

(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

Practicum/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

Graduate Teaching Experience, 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. **Prereq:** 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'.

Course Descriptions

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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 199. Special Topics. 1-5 Credits.

AHSS 493. Undergraduate Research. 1-5 Credits.

AHSS 690. Seminar. 1-5 Credits.

AHSS 796. Special Topics. 1-5 Credits.

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.

Study of the basic concepts of accounting applied to businesses, and the use of accounting information as a basis for decision-making. The focus is on operating activities of companies. Prereq: Sophomore standing. Coreq: CSCI 116.

ACCT 201. Elements of Accounting II. 3 Credits.

Study of the basic concepts of accounting applied to businesses, and the use of accounting information as a basis for decision-making. The focus is on the investing and financing activities of a company. Prereq: Sophomore standing, ACCT 200.

ACCT 291. Seminar. 1-3 Credits.

ACCT 292. Study Abroad. 1-15 Credits.

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 201. 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, Jr or Sr classification, 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, Jr or Sr classification, 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 201. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 342. Fundamentals of Financial Planning. 3 Credits.

Introduction to the concepts of personal financial planning: investing, budgeting, insurance, taxes, retirement and estate planning. Prereq: ACCT 201. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 379. Study Tour Abroad. 1-6 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 391. Seminar. 1-3 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 392. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Jr or Sr classification, 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: ACCT 201. 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 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 611.}.

ACCT 412. Computer Crime, Forensics, and Investigation. 3 Credits.

Introduction to the technical and legal aspects of obtaining and analyzing digital information for use as evidence in civil, criminal, or administrative cases. Prereq: MIS 320 and ACCT 410 or MIS 376 or CSCI 372 and students must be College of Business students who have been admitted to the professional program and have a cumulative GPA of 2.5 or higher. Cross-listed with MIS.

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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 625.}.

ACCT 430. Tax Practice & Research. 3 Credits.

Study of the fundamental concepts of tax practice and tax research methods. 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.

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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see ACCT 640.}.

ACCT 491. Seminar. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 492. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

ACCT 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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 693. Individual Study/Tutorial. 1-5 Credits.**ACCT 720. Strategic Cost Management. 3 Credits.**

Study of the role of cost management methods in aiding managers in all of their planning, controlling and evaluating activities; focus on the role of managerial accounting information for decision-making throughout organizational activities.

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. Fe/Coop Ed/Internship. 1-15 Credits.****ACCT 796. Special Topics. 1-5 Credits.**

Aerospace Studies (AS)

AS 110. Air Force ROTC Fitness. 1 Credit.

Physical Training classes are designed to make students aware of the benefits of being physically fit and participating in lifetime fitness programs. May be repeated. F, S.

AS 111. The Air Force Today I. 1 Credit.

Introduces students to the United State Air Force and provides an overview of the basic character, missions, and organization of the Air Force. F.

AS 112. The Air Force Today II. 1 Credit.

Continuation of AS 111; provides an overview of the basic characteristics, missions and organization of the Air Force. S.

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. 1 Credit.**

Introduction to Air Force customs and courtesies, drill and ceremonies, and military structure. May be repeated. F, S.

AS 211. Evolution of USAF Air and Space Power I. 1 Credit.

Introduction to Air Force heritage and leaders, Air Force concepts, ethics and values, leadership, and the application of both oral and written communication skills. Course content covers air power history from 1783-1960. F.

AS 212. Evolution of USAF Air and Space Power II. 1 Credit.

Continuation of AS 211, includes an introduction to Air Force heritage and leaders, Air Force concepts, ethics and values, leadership, and the application of both oral and written communication skills. Prepares cadets for Field Training. Course content covers air power history from 1960 to the intermediate future. S.

AS 291. Seminar. 1-3 Credits.

AS 292. Study Abroad. 1-15 Credits.

AS 294. Individual Study. 1-5 Credits.

AS 299. Special Topics. 1-5 Credits.

AS 321. Air Force Leadership Management I. 3 Credits.

Introduction to leadership and management within the USAF, in both theory and practical application emphasizing communication skills (in both oral and written Air Force formats) and interpersonal skills. F.

AS 322. Air Force Leadership Management II. 3 Credits.

Study of leadership from the military perspective emphasizing situational leadership and contemporary issues including change management and professional ethics. Case studies are used to illustrate leadership concepts. Officer professional development topics are discussed. S.

AS 379. Study Tour Abroad. 1-6 Credits.

AS 391. Seminar. 1-3 Credits.

AS 392. Study Abroad. 1-15 Credits.

AS 394. Individual Study. 1-5 Credits.

AS 399. Special Topics. 1-5 Credits.

AS 410. Leadership Laboratory. 1 Credit.

Development of leadership skills in a practical, supervised laboratory. Students must instruct, supervise, and lead junior cadets participating in AS 210, and perform high-level management functions with the cadet corps organization. May be repeated. F, S.

AS 441. Preparation For Active Duty I. 3 Credits.

A study of the national security process, regional studies, advanced leadership ethics and Air Force doctrine. Topics include the military as a profession, officership, military justice, civilian control of the military, and current issues. Application of communication skills is included. F.

AS 442. Preparation for Active Duty II. 3 Credits.

A continuation of AS 441. Topics include the military as a profession, officership, military justice, civilian control of the military, and current issues. Continued application of communication skills and preparation for a new officer's first active duty assignment. S.

AS 491. Seminar. 1-5 Credits.

AS 492. Study Abroad. 1-15 Credits.

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 220. World Agricultural Development. 3 Credits.

Introduction to theories, policies, and practices to increase food production and agricultural development in developing countries. 2 lectures. Prereq: ECON 201.

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. Study Abroad. 1-15 Credits.**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 146 and CSCI 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: AGECE 242.

AGEC 344. Agricultural Price Analysis. 3 Credits.

Introduction to price analysis in agricultural markets. 3 lectures. Prereq: AGECE 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 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. Study Tour Abroad. 1-6 Credits.**AGEC 394. Individual Study. 1-5 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: AGECE 242, AGECE 244, or AGECE 246.

AGEC 444. 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: AGECE 339. {Also offered for graduate credit - see AGECE 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: AGECE 344. Coreq: AGECE 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: AGECE 339, AGECE 346. {Also offered for graduate credit - see AGECE 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: AGECE 450.

AGEC 452. Food Laws & Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. Prereq: SAFE 470. Cross-listed with CFS 452 and SAFE 452.

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: AGECE 378 and AGECE 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. F, S, Su. {Also offered for graduate credit - see AGECE 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. Study Abroad. 1-15 Credits.****AGEC 494. Individual Study. 1-5 Credits.****AGEC 496. Field Experience. 1-15 Credits.****AGEC 499. Special Topics. 1-5 Credits.****AGEC 644. 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 798. Master's Thesis. 1-10 Credits.**

Agricultural & Biosystems Engineering (ABEN)

ABEN 110. Introduction to Agricultural and Biosystems Engineering. 2 Credits.

Introduction to the agricultural and biosystems engineering profession with emphasis on engineering problem solving. 2 lectures. Prereq: MATH 103 or MATH 107. F.

ABEN 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. Repeated course opportunity exists for failing grades only. Cross-listed with AGRI 189, BUSN 189, HD&E 189, ME 189 and UNIV 189. F, S.

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 or CSCI 114, MATH 146 or MATH 165 and PHYS 211 or ME 221. S.

ABEN 291. Seminar. 1-3 Credits.**ABEN 292. Study Abroad. 1-15 Credits.****ABEN 294. Individual Study. 1-3 Credits.****ABEN 299. Special Topics. 1-5 Credits.****ABEN 358. Electric Energy Application in Agriculture. 3 Credits.**

Electrical distribution/services. Electrical control units, solid state and digital electronics, electromagnetic sensors, and sensing techniques with applications to food, agricultural, and biological systems. 2 lectures, 1 three-hour laboratory. Prereq: PHYS 252. F.

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. Study Tour Abroad. 1-6 Credits.**ABEN 383. Structural Design for Biosystems. 3 Credits.**

Study of framing systems, building materials, and load requirements. Analysis and design of structures for biosystems. 3 lectures. Prereq: ME 223. F.

ABEN 391. Seminar. 1-3 Credits.**ABEN 392. Study Abroad. 1-15 Credits.****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 450. 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. Prereq: ABEN 263 and MATH 166.

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: Junior standing. 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: Senior standing. F.

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. Study Abroad. 1-15 Credits.****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 763. Theory of Drying Biological Products. 3 Credits.

Theory used to describe the drying processes of biological products. 3 lectures. F.

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 773. Advanced Agricultural Power and Machinery. 3 Credits.

Theory and design of agricultural power units and field machines. 3 lectures. Prereq: ABEN 673. F.

ABEN 783. Advanced Structures and Environmental Systems. 3 Credits.

Detailed analysis of building components and advanced design problems relating to agricultural and environmental systems. 3 lectures. S.

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. Prereq: 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, MATH 105, MATH 107 or MATH 146.

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 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 291. Seminar. 1-3 Credits.

ASM 292. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.**ASM 391. Seminar. 1-3 Credits.****ASM 392. Study Abroad. 1-15 Credits.****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: PHYS 211, Junior standing.

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. Study Abroad. 1-15 Credits.****ASM 494. Individual Study. 1-5 Credits.****ASM 496. Field Experience. 1-15 Credits.****ASM 499. Special Topics. 1-5 Credits.****ASM 654. 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. {Also offered for undergraduate credit - see ASM 454.}.

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 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. Repeated course opportunity exists for failing grades only. Cross-listed with ABEN 189, BUSN 189, HD&E 189, ME 189 and UNIV 189. F.

AGRI 291. Seminar. 1-3 Credits.

AGRI 292. Study Abroad. 1-15 Credits.

AGRI 294. Individual Study. 1-5 Credits.

AGRI 379. Study Tour Abroad. 1-6 Credits.

AGRI 391. Seminar. 1-3 Credits.

AGRI 392. Study Abroad. 1-15 Credits.

AGRI 394. Individual Study. 1-5 Credits.

AGRI 397. Coop/Internship. 1-4 Credits.

AGRI 492. Study Abroad. 1-15 Credits.

AGRI 496. Field Experience. 1-15 Credits.

Animal Sciences (ANSC)

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 123. Feeds and Feeding. 3 Credits.

Principles of feeding livestock including digestive systems, nutrient requirements, nutrient characteristics, and sources utilized in the formulation of balanced rations. 2 lectures, 1 two-hour laboratory.

ANSC 150. Animal Science Orientation. 1 Credit.

Students will be introduced to opportunities and professional advancement in the animal sciences. Overview of majors, minors, and options offered in the Department of Animal Sciences, activities, and support services.

ANSC 194. Individual Study. 1-5 Credits.

ANSC 196. Field Experience. 1-15 Credits.

ANSC 199. Special Topics. 1-5 Credits.

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 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. Prereq: ANSC 240. 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 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 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. Study Abroad. 1-15 Credits.****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 335. Competitive Equine Evaluation. 2 Credits.

Evaluation of horse conformation, selection criteria, and judging standards for national equine judging competitions. 2 three-hour laboratories plus time to be arranged. Prereq: ANSC 235. 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 343. Humane Slaughter and Meat Cutting. 3 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.

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 BOT 315 or PLSC 315 or ZOO 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: VETS 135 or BIOL 220. Recommended prereq: ANSC 114 and MICR 202 or MICR 350.

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 378. Animal Health Management. 1 Credit.

This course introduces the student to learning through a case-based approach to animal disease. Case material highlights health problems seen in the Midwest. Case questions encourage students to think about disease prevention, management and eradication. May be repeated for credit. Prereq: VETS 135. Recommended Prereq: ANSC 114.

ANSC 379. Study Tour Abroad. 1-6 Credits.**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 391. Seminar. 1-5 Credits.**ANSC 392. Study Abroad. 1-15 Credits.****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 435. Nutrition Laboratory Techniques. 3 Credits.

Theory and basic laboratory techniques associated with nutritional research and current information regarding advanced techniques and developments. 2 lectures, laboratory by arrangement. Prereq: CHEM 260. F (even years) {Also offered for graduate credit - see ANSC 635.}.

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: ANSC 340. {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 463. Physiology of Reproduction. 3 Credits.

Comparative anatomy, physiology, and endocrinology of reproduction in mammals. Cross-listed with ZOO 463. {Also offered for graduate credit - see ANSC 663.}.

ANSC 463L. Physiology of Reproduction Laboratory. 1 Credit.

Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. Cross-listed with ZOO 463L. Prereq: ANSC 463. {Also offered for graduate credit - see 663L.}.

ANSC 464. Reproduction Management Procedures. 2 Credits.

Demonstration and utilization of the new technology in large animal reproductive management including embryo and semen collection, pregnancy diagnosis, and estrous control. 1 lecture, 1 three-hour laboratory. Prereq: ANSC 463. F.

ANSC 466. Principles of Mixed Feed Technology, Production and Management. 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.

ANSC 470. Applied Nutrition. 4 Credits.

Application of nutrition principles in feed management systems for livestock with emphasis on energy and protein (ruminants) and energy and amino acids (non-ruminants). 4 lectures. Prereq: ANSC 323. S.

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 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. Study Abroad. 1-15 Credits.****ANSC 494. Individual Study. 1-5 Credits.****ANSC 496. Field Experience. 1-15 Credits.****ANSC 499. Special Topics. 1-5 Credits.****ANSC 635. Nutrition Laboratory Techniques. 3 Credits.**

Theory and basic laboratory techniques associated with nutritional research and current information regarding advanced techniques and developments. 2 lectures, laboratory by arrangement. F (even years) {Also offered for undergraduate credit - see ANSC 435.}.

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. Cross-listed with ZOO 663. {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. Cross-listed with ZOO 663L. {Also offered for undergraduate credit - see ANSC 443L.}.

ANSC 677. Animal Preventive Medicine. 3 Credits.

Course incorporates factors that contribute to development of animal medical conditions/diseases and how these factors can be manipulated to prevent or control the condition or disease. Emphasis will be placed on undergraduate preventive medicine. {Also offered for undergraduate credit - see ANSC 477.}.

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 721. Biology of Lactation. 2 Credits.**

Mammary gland development and mechanisms controlling lactation. 2 lectures.

ANSC 736. Experimental Nutrition Methods. 1 Credit.

Design, conductance, analysis, and reporting of experiments taken in conjunction with ANSC 773, ANSC 774, ANSC 775, or 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 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 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 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 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. Prereq: ANTH 111.

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. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.**ANTH 391. Seminar. 1-3 Credits.****ANTH 392. Study Abroad. 1-15 Credits.****ANTH 394. Individual Study. 1-5 Credits.****ANTH 399. Special Topics. 1-5 Credits.****ANTH 432. Human Osteology. 3 Credits.**

The analysis of human bones. Areas of study include skeletal anatomy, human biological individualization and interpretation of archaeological and paleontological skeletal material. Prereq: ANTH 111, ANTH 204, ANTH 205. {Also offered for graduate credit - see ANTH 632.}

ANTH 433. Apes and Human Evolution. 3 Credits.

A laboratory-oriented survey of living primates describing and comparing the diverse behavioral and morphological adaptations of great apes in a human evolutionary context. Prereq: ANTH 111, ANTH 204, ANTH 205. {Also offered for graduate credit - see ANTH 633.}

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 443. Peoples and Cultures of the Middle East & North Africa. 3 Credits.

Survey of ethnographic research on the Middle East and North Africa. Topics include Islam, colonialism, nation-states, civil society, gender, rights, globalization, economic development, immigration, indigenous peoples, terrorism, youth culture, and revolution. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 643.}

ANTH 444. Peoples of the Pacific Islands. 3 Credits.

General survey of cultures, past and present, in Melanesia, Polynesia, and Micronesia. {Also offered for graduate credit - see ANTH 644.}

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 459. Global Cultural Heritage. 3 Credits.

Examines the global relevance of cultural heritage and international cultural resource management. Topics include cultural property, antiquities, UNESCO World Heritage, intangible heritage, landscapes, indigenous peoples, repatriation, rights, conflict, memory, identity, tourism, development. Prereq: ANTH 111. {Also offered for graduate credit - see ANTH 659.}

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. Cross-listed with EMGT 464. {Also offered for graduate credit - see ANTH 664.}

ANTH 470. Analysis & Interpretation in Archaeology. 3 Credits.

This course addresses archaeology as both a scientific and interpretive endeavor through historical context and contemporary problem-based approach. This course also covers basics of a scientific, analytic approach (theories, models, hypotheses, testing) and foundations for interpretation (creativity, preconceptions, contextualization). 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 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. Qualitative Methods in Cultural Anthropology. 3 Credits.

Focuses on qualitative research methods utilized in cultural anthropology and other social sciences. Instruction and application of ethnographic, discourse-centered, visual anthropology, interview/focus group, extended case study, and other qualitative survey methods and forms of 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. Study Abroad. 1-15 Credits.****ANTH 494. Individual Study. 1-5 Credits.****ANTH 496. Field Experience. 1-15 Credits.****ANTH 499. Special Topics. 1-5 Credits.****ANTH 632. Human Osteology. 3 Credits.**

The analysis of human bones. Areas of study include skeletal anatomy, human biological individualization and interpretation of archaeological and paleontological skeletal material. {Also offered for undergraduate credit - see ANTH 432.}

ANTH 633. Apes and Human Evolution. 3 Credits.

A laboratory-oriented survey of living primates describing and comparing the diverse behavioral and morphological adaptations of great apes in a human evolutionary context. {Also offered for undergraduate credit - see ANTH 633.}

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 643. Peoples and Cultures of the Middle East & North Africa. 3 Credits.

Survey of ethnographic research on the Middle East and North Africa. Topics include Islam, colonialism, nation-states, civil society, gender, rights, globalization, economic development, immigration, indigenous peoples, terrorism, youth culture, and revolution. {Also offered for undergraduate credit - see ANTH 443.}

ANTH 644. Peoples of the Pacific Islands. 3 Credits.

General survey of cultures, past and present, in Melanesia, Polynesia, and Micronesia. {Also offered for undergraduate credit - see ANTH 444.}

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 659. Global Cultural Heritage. 3 Credits.

Examines the global relevance of cultural heritage and international cultural resource management. Topics include cultural property, antiquities, UNESCO World Heritage, intangible heritage, landscapes, indigenous peoples, repatriation, rights, conflict, memory, identity, tourism, development. {Also offered for undergraduate credit - see ANTH 459.}

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. Cross-listed with EMGT 664. {Also offered for undergraduate credit - see ANTH 464.}

ANTH 670. Analysis & Interpretation in Archaeology. 3 Credits.

This course addresses archaeology as both a scientific and interpretive endeavor through historical context and contemporary problem-based approach. This course also covers basics of a scientific, analytic approach (theories, models, hypotheses, testing) and foundations for interpretation (creativity, preconceptions, contextualization). {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 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. Qualitative Methods in Cultural Anthropology. 3 Credits.

Focuses on qualitative research methods utilized in cultural anthropology and other social sciences. Instruction and application of ethnographic, discourse-centered, visual anthropology, interview/focus group, extended case study, and other qualitative survey methods and forms of 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 Travel Management. 3 Credits.

Application of management principles and techniques to the tourism and resort industry with emphasis on tourism components, recreational activities, and impact of the travel and tourism industry. 3 lectures. S.

ADHM 151. Design Fundamentals. 3 Credits.

Study and application of elements and principles of design; two- and three-dimensional applications. Co-req: ADHM 160, ADHM 161 Prereq: Interior Design major. F, S.

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 160. F.

ADHM 162. Intermediate Manual Drafting. 3 Credits.

Continued study of building construction, materials, and methods. Technical and graphic communication for interior design, with an emphasis placed on manual drafting, detailing and document organization. Prereq: ADHM 161 with a grade of C or higher and Interior Design majors only. Co-req: ADHM 261. S.

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; ration analysis; budgeting, financial statement analysis and interpretation. Prereq: ACCT 102, ADHM 140, ADHM 141. F.

ADHM 245. Contemporary Issues of Controlled Beverages. 3 Credits.

The study of historic, social, ethical, physiological and legal issues relating to alcoholic beverage service and use in contemporary America with emphasis on responsible and knowledgeable service of beer, wine, and spirits in hospitality operations.

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 151, ADHM 160, ADHM 162 and ADHM 261 with a grade of C or higher in all prereq courses. Co-req: ADHM 264 and ADHM 365. F.

ADHM 253. Interior Design Studio II-Office Design. 2 Credits.

Application of design theory and process to analyze office environments. Emphasis on programming, schematics, design development, human factors, and construction documentation of business environments. Prereq: Interior Design major, minimum of 3.00 cumulative GPA, ADHM 251, ADHM 264 and ADHM 365 with a grade of C or higher in all prereq courses. Coreq: ADHM 254 and ADHM 368. S.

ADHM 254. Interior Design Studio III. 2 Credits.

Application of design theory and process to analyze small commercial environments. Emphasis on programming, schematics, design development, and construction documentation. Prereq: ADHM 251, ADHM 264, ADHM 365 with a grade of C or higher in all prereq courses, Interior Design major with a 3.0 cumulative GPA. Coreq: ADHM 253 and ADHM 368. S.

ADHM 261. Visual Communications. 3 Credits.

Principles and methods of drawing and sketching, including perspective, with an emphasis on a variety of rendering techniques and media. Prereq: Interior Design major.

ADHM 264. Residential Systems. 2 Credits.

Introduction of basic principles of lighting design and interior systems in residential applications. Prereq: ADHM 151, ADHM 160, ADHM 162, ADHM 261 all with a grade of C or better and Interior Design majors with a minimum cumulative 3.0 GPA or Apparel, Retail Merchandising and Design majors. Coreq: ADHM 251, ADHM 365. F.

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 291. Seminar. 1-3 Credits.**ADHM 292. Study Abroad. 1-15 Credits.****ADHM 294. Individual Study. 1-5 Credits.****ADHM 299. Special Topics. 1-5 Credits.****ADHM 300. Design Resource Management. 1-3 Credits.**

Management of resources used by interior designers, including references, product information, and material samples. May be repeated up to 2 times. Prereq: ADHM 254, ADHM 368 with a grade of C or higher and students must be Interior Design majors with a minimum of 3.00 cumulative GPA.

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 IV-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 254 and ADHM 368 with a grade of C or higher. Coreq: ADHM 363 and ADHM 460.

ADHM 353. Interior Design Studio V-Large Scale Contract Design. 3 Credits.

Application of design components to large scale commercial projects with emphasis on systems furniture, interior codes, and building systems. Prereq: ADHM 351, ADHM 363, ADHM 460 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. Coreq: ADHM 461. S.

ADHM 355. Flat Pattern Design & Draping. 3 Credits.

Developing original patterns through flat pattern design and draping for individual and commercial applications. Prereq: ADHM 155. S.

ADHM 356. Pattern Drafting and Grading. 3 Credits.

Individual and commercial apparel patterns are created with the pattern drafting method. Grading, a system of making a range of sizes for a master pattern, is examined. Prereq: ADHM 155. S.

ADHM 357. Product Development: Designing Pants. 3 Credits.

Fundamentals of drafting and fitting pants patterns for the human figure. A pants "sloper" will be created for a particular figure. The sloper will be used to design and construct pants. Prereq: ADHM 155.

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 253, ADHM 254, ADHM 368 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. Coreq: ADHM 351 and ADHM 460. F.

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 251, ADHM 264. Prereq: ADHM 162 and ADHM 261 with a grade of C or better and students must be Interior Design majors with a minimum cumulative GPA of 3.0. F, S.

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. 2 Credits.

This course examines the characteristics, applications, specifications and sustainability of materials used in interior spaces. S.

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 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 BUSN 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: ADHM 272 and at least junior standing.

ADHM 379. Study Tour Abroad. 1-6 Credits.**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, MRKT 320. S.

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 August 31st.

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 391. Seminar. 1-3 Credits.**ADHM 392. Study Abroad. 1-15 Credits.****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 402. Professional Catering Management. 3 Credits.

Study and application of advanced operational managerial principles of food service management for on- or off-premise catering and special events. Prereq: HNES 141, HNES 261, HNES 261L. F.

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. Prereq: HNES 261, HNES 261L. Co-Req: ADHM 404L. S.

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. S.

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. Advanced Apparel Assembly. 3 Credits.

Application of principles and concepts of advanced apparel assembly to finished products. Prototype development and advanced dressmaking techniques applied to clothing for men, women, and children. 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 254 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 363.

ADHM 461. Building Information Modeling. 3 Credits.

Computer-aided design, modeling and rendering emphasizing applications in interior design. Prereq: ADHM 351, ADHM 363 and ADHM 460 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 353.

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, 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, and COMM 216, COMM 271, COMM 308, COMM 315 or COMM 383 and at least junior standing. S.

ADHM 485. Global Consumer Analysis. 3 Credits.

This course provides a comprehensive analysis of today's global consumers in the fashion industry by investigating personal differences and environmental influences. This course focuses on the exploration of diversity in the global fashion market and marketing strategies to deal with the diversity. Prereq: ADHM 171, ADHM 385 and PSYC 111. {Also offered for graduate credit - see ADHM 685.}

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. Study Abroad. 1-15 Credits.****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 685. Global Consumer Analysis. 3 Credits.

This course provides a comprehensive analysis of today's global consumers in the fashion industry by investigating personal differences and environmental influences. This course focuses on the exploration of diversity in the global fashion market and marketing strategies to deal with the diversity. {Also offered for undergraduate credit - see ADHM 485.}

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 760. Historical and Contemporary Issues in Trade. 3 Credits.

The examination of fiber, textile, and apparel industries in a global context. Historical development of global and U.S. textile and apparel industries and how the economic, political, and social systems affect production and trade. Prereq: ADHM 710, ADHM 720, ADHM 730, ADHM 740, ADHM 750.

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 101. First-Year Arabic I. 4 Credits.

Basic structures and vocabulary of modern standard Arabic. Practice in the fundamentals of listening, speaking, reading, and writing; introduction to the cultural context of the Arabic-speaking world. No previous knowledge of Arabic required. Not open to native speakers of Arabic.

ARB 102. First-Year Arabic II. 4 Credits.

Basic structures and vocabulary of modern standard Arabic. Practice in the fundamentals of listening, speaking, reading, and writing; introduction to the cultural context of the Arabic-speaking world. Continuation of ARB 101. Not open to native speakers of Arabic.

ARB 201. Second-Year Arabic I. 3 Credits.

Extended practice with grammatical structures and practical vocabulary to develop proficiency in listening and speaking; additional emphasis on development of skills in reading and writing; cultural topics. Prereq: ARB 102 or equivalent.

ARB 202. Second-Year Arabic II. 3 Credits.

Extended practice with grammatical structures and practical vocabulary to develop proficiency in listening and speaking; additional emphasis on development of skills in reading and writing; cultural topics. Prereq: ARB 201 or equivalent.

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. Architectural Drawing. 3 Credits.

Instruction in traditional (non-digital) representation of architectural designs: elevations, plans, sections, perspectives. Practice with presentation techniques. Prereq: Admission into the second year of the Architecture or Landscape 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.

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. Study Abroad. 1-15 Credits.

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 of Architecture II. 3 Credits.

History of architecture from the Baroque to the present placing 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.

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. 4 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. Study Tour Abroad. 1-6 Credits.

ARCH 391. Seminar. 1-3 Credits.

ARCH 392. Study Abroad. 1-15 Credits.

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 475. Design Build Studio. 6 Credits.

Studio course resulting in completed small-scale construction project. This course may be repeated for credit. {Also offered for graduate credit - see ARCH 675.}.

ARCH 491. Seminar. 1-5 Credits.

ARCH 492. Study Abroad. 1-15 Credits.

ARCH 494. Individual Study. 1-5 Credits.

ARCH 496. Field Experience. 1-15 Credits.

ARCH 499. Special Topics. 1-5 Credits.

ARCH 675. Design Build Studio. 6 Credits.

Studio course resulting in completed small-scale construction project. This course may be repeated for credit. {Also offered for undergraduate credit - see ARCH 475.}.

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. Programming/Thesis Prep. 3 Credits.

Discussion and application of a comprehensive design process for production of the design thesis. Emphasis on preparing a design program.

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. Two-Dimensional Design. 3 Credits.

Basic study of two-dimensional design for the studio artist.

ART 124. Three-Dimensional Design. 3 Credits.

Basic study of three-dimensional design for the studio artist.

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 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. Design and Digital Media I. 3 Credits.

Introduction to digital technologies and their applications in design and visual arts.

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. Photography II. 3 Credits.

Intermediate study, studio practice, and critique. Use of traditional and alternative black and white and color processes. Emphasis on image gathering strategies. Development of individual concept and content. Prereq: ART 180.

ART 285. Design and Digital Media II. 3 Credits.

Intermediate study, studio practice and critique in digital media. Extension and exploration of computer applications of value to the studio artist. Prereq: ART 185.

ART 291. Seminar. 1-3 Credits.**ART 292. Study Abroad. 1-15 Credits.****ART 294. Individual Study. 1-3 Credits.****ART 299. Special Topics. 1-5 Credits.****ART 320. Painting III. 3 Credits.**

Advanced study, studio practice, and critique. Exploration of mixed-media. Emphasis on individual concept and content. Prereq: ART 220.

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. Ceramics III. 3 Credits.

Advanced study and studio practice with individual and group critique. Focus on current issues in ceramics and innovative use of form, process, and materials. Emphasis on individual concept and content. Prereq: ART 250.

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. Printmaking III. 3 Credits.

Advanced study, studio practice, the human figure, and critique. Exploration of mixed-media. Emphasis on individual concept and content. Prereq: ART 270.

ART 379. Study Tour Abroad. 1-6 Credits.**ART 380. Photography III. 3 Credits.**

Advanced study, studio practice, and critique. Professional practice, promotion, and presentation. Emphasis on individual concept and content. Prereq: ART 280.

ART 385. Design and Digital Media III. 3 Credits.

Advanced study, studio practice and critique in digital media. Exploring computer studio potential of 2-, 3-, and 4-Dimensional applications. Prereq: ART 285.

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. Study Abroad. 1-3 Credits.****ART 394. Individual Study. 1-3 Credits.****ART 399. Special Topics. 1-5 Credits.****ART 420. Painting IV. 3 Credits.**

Advanced study, studio practice and critique in painting. Exploration and development of an individual concept. May be repeated. 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. Ceramics IV. 3 Credits.

Advanced study, studio practice and critique in ceramics. A focus on current issues in ceramics with innovative use of form, process and materials centered in a personal use of content and formal issues. May be repeated. 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. Printmaking IV. 3 Credits.

Advanced study, studio practice and critique in printmaking. Exploration in printmaking of individual concept, process and professional preparation. May be repeated. Prereq: ART 370.

ART 480. Photography IV. 3 Credits.

Advanced study, studio practice and critique in photography. Students will expand knowledge of processes while extending their personal exploration. May be repeated. Prereq: ART 380.

ART 485. Design and Digital Media IV. 3 Credits.

Development and application of concepts and practices related to digital technologies in design and visual arts through individual semester projects. May be repeated. 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. Study Abroad. 1-15 Credits.

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.

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. Also listed under CHEM 260.

BIOC 291. Seminar. 1-3 Credits.

BIOC 292. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.

BIOC 391. Seminar. 1-3 Credits.

BIOC 392. Study Abroad. 1-15 Credits.

BIOC 394. Individual Study. 1-5 Credits.

BIOC 399. Special Topics. 1-5 Credits.

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 342. Recommended Prereq: BIOL 150. {Also offered for graduate credit - see BIOC 660.}.

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 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 465. Principles of Physical Chemistry and Biophysics. 4 Credits.

Conceptual approach to physical chemistry and biophysics; molecular structure, energy, equilibria, and kinetics. Application of fundamental concepts and related instrumental techniques to the life sciences. 4 lectures. Prereq: MATH 147 or MATH 166, PHYS 212. Coreq: BIOC 460. {Also offered for graduate credit - see BIOC 665.}.

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. Study Abroad. 1-15 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 665. Principles of Physical Chemistry and Biophysics. 4 Credits.

Conceptual approach to physical chemistry and biophysics; molecular structure, energy, equilibria, and kinetics. Application of fundamental concepts and related instrumental techniques to the life sciences. 4 lectures. Coreq: BIOC 660. {Also offered for undergraduate credit - see BIOC 465.}.

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 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. Cross-listed with PLSC 721. S.

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 899. Doctoral Dissertation. 1-15 Credits.**

Biological Sciences (BIOL)

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.

BIOL 111L. Concepts of Biology Lab. 1 Credit.

Introduction to a wide range of biological topics, from the organism, ecology, and evolution to the cell, molecular biology, and genetics.

BIOL 124. Environmental Science. 3 Credits.

Ecological principles related to human cultures, resource use, and environmental alterations.

BIOL 124L. Environmental Science Laboratory. 1 Credit.

Ecological principles related to human cultures, resource use, and environmental alterations.

BIOL 126. Human Biology. 3 Credits.

Consideration of selected problems in human biology. Cross-listed with ZOO 126.

BIOL 126L. Human Biology Laboratory. 1 Credit.

Consideration of selected problems in human biology. Cross-listed with ZOO 126L.

BIOL 150. General Biology I. 3 Credits.

Introduction to cellular and molecular biology, genetics, and evolution.

BIOL 150L. General Biology I Laboratory. 1 Credit.

Introduction to cellular and molecular biology, genetics, and evolution.

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. Prereq: BIOL 150.

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 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 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 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 270. Antibiotic Drug 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. Wildlife Ecology and Conservation: An Undergraduate Research Course. 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 291. Seminar. 1-3 Credits.**BIOL 292. Study Abroad. 1-15 Credits.****BIOL 293. Undergraduate Research. 1-5 Credits.****BIOL 294. Individual Study. 1-5 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 BOT 315, PLSC 315 and ZOO 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 BOT 315L, PLSC 315L and ZOO 315L. F, S.

BIOL 359. Evolution. 3 Credits.

Discussion of the mechanisms of evolution, including population genetics, selection, speciation, adaptation, and molecular evolution. Capstone course for Botany and Biological Sciences majors. Prereq: BIOL 150, BIOL 151 and BIOL 315.

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 or BIOL 151. Cross-listed with ZOO 364.

BIOL 379. Study Tour Abroad. 1-6 Credits.**BIOL 391. Seminar. 1-3 Credits.****BIOL 392. Study Abroad. 1-15 Credits.****BIOL 393. Undergraduate Research. 1-5 Credits.****BIOL 394. Individual Study. 1-5 Credits.****BIOL 399. Special Topics. 1-5 Credits.****BIOL 478. Methods in Animal Physiology. 3 Credits.**

Students will investigate physiological functions at the cell, tissue, organ and organismal levels. Prereq: BIOL 150 and BIOL 151 and ZOO 460 or ZOO 462. {Also offered for graduate credit - see BIOL 678.}

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 BOT 315 or PLSC 315 or ZOO 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 491. Seminar. 1-5 Credits.

BIOL 492. Study Abroad. 1-15 Credits.

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 678. Methods in Animal Physiology. 3 Credits.

Students will investigate physiological functions at the cell, tissue, organ and organismal levels. {Also offered for undergraduate credit - see BIOL 478.}.

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 695. Field Experience. 1-15 Credits.

BIOL 696. Special Topics. 1-5 Credits.

BIOL 766. 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. Cross-listed with ZOO 766.

BIOL 790. Graduate Seminar. 1-3 Credits.

BIOL 791. Temporary/Trial Topics. 1-5 Credits.

BIOL 793. Indiv 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 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 842. Quantitative Biology. 3 Credits.

Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. S Cross-listed with ENT 842.

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 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 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 876. Population Dynamics. 4 Credits.

Principles and mechanics of animal population dynamics. Prereq: an interest in working with numbers. S (odd years).

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 893. Individual Study/Tutorial. 1-5 Credits.**BIOL 895. Field Experience. 1-15 Credits.**

Botany (BOT)

BOT 194. Individual Study. 1-3 Credits.**BOT 196. Field Experience. 1-15 Credits.****BOT 199. Special Topics. 1-5 Credits.****BOT 291. Seminar. 1-3 Credits.****BOT 292. Study Abroad. 1-15 Credits.****BOT 294. Individual Study. 1-5 Credits.****BOT 299. Special Topics. 1-5 Credits.****BOT 314. 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'. Prereq: BIOL 151, 151L.

BOT 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, PLSC 315 and ZOO 315. F, S.

BOT 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, PLSC 315L, and ZOO 315L. F, S.

BOT 372. Structure and Diversity of Plants and Fungi. 4 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.

BOT 379. Study Tour Abroad. 1-6 Credits.**BOT 380. Plant Physiology. 3 Credits.**

Broad coverage of plant growth and metabolism including water relations, mineral nutrition, photobiology, carbon fixation, metabolic processes, stress responses, developmental biology, and growth regulation. Prereq: BIOL 150.

BOT 391. Seminar. 1-3 Credits.**BOT 392. Study Abroad. 1-15 Credits.****BOT 394. Individual Study. 1-5 Credits.****BOT 399. Special Topics. 1-5 Credits.****BOT 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. Cross-listed with PLSC 431 and ZOO 431. F {Also offered for graduate credit - see BOT 631.}

BOT 450. Range Plants. 3 Credits.

Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Prereq: BOT 314. Cross-listed with RNG 450. F {Also offered for graduate credit - see BOT 650.}

BOT 460. 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 151, BIOL 151L. Cross-listed with RNG 460. {Also offered for graduate credit - see BOT 660.}

BOT 491. Seminar. 1-5 Credits.

BOT 492. Study Abroad. 1-15 Credits.

BOT 494. Individual Study. 1-5 Credits.

BOT 496. Field Experience. 1-15 Credits.

BOT 499. Special Topics. 1-5 Credits.

BOT 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. Cross-listed with PLSC 631 and ZOO 631. F {Also offered for undergraduate credit - see BOT 431.}

BOT 650. Range Plants. 3 Credits.

Identification, distribution, and forage value of important U.S. range plants. 1 lecture, 2 two-hour laboratories. Cross-listed with PLSC 650. F {Also offered for undergraduate credit - see BOT 450.}

BOT 660. 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. Cross-listed with RNG 660. {Also offered for undergraduate credit - see BOT 460.}

BOT 690. Graduate Seminar. 1-3 Credits.

BOT 695. Field Experience. 1-15 Credits.

BOT 696. Special Topics. 1-5 Credits.

BOT 716. Agrostology. 3 Credits.

Identification and description of U.S. grasses and grass-like plants. 2 lectures, 2 two-hour laboratories. Cross-listed with RNG 716. F (even years).

BOT 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. Cross-listed with RNG 717. F (odd years).

BOT 790. Graduate Seminar. 1-3 Credits.

BOT 791. Temporary/Trial Topics. 1-5 Credits.

BOT 793. Individual Study/Tutorial. 1-5 Credits.

BOT 795. Field Experience. 1-15 Credits.

BOT 796. Special Topics. 1-5 Credits.

BOT 797. Master's Paper. 1-3 Credits.

BOT 798. Master's Thesis. 1-10 Credits.

BOT 820. Advanced Cell Biology. 3 Credits.

In-depth survey of cell biology, including studies of membranes, secretion cytoskeleton, cellular movement organelles, and gene regulation. Prereq: BIOC 702. Cross-listed with ZOO 820.

BOT 862. Environment and Adaptation. 3 Credits.

Environmental factors and responses evidenced with life-history patterns, genetic variation, population dynamics, species-interactions, and physiological processes.

BOT 864. Ecological Processes. 3 Credits.

Ecosystem dynamics (short-term, successional, evolutionary), component interactions, ecological energetics, and biogeochemical transfers, with consideration of anthropogenic aspects. Historical and theoretical viewpoints included.

BOT 899. Doctoral Dissertation. 1-15 Credits.

Business Administration (BUSN)

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. Repeated course opportunity exists for failing grades only. Cross-listed with ABEN 189, AGRI 189, HD&E 189, ME 189, and UNIV 189.

BUSN 194. Individual Study. 1-3 Credits.

BUSN 196. Field Experience. 1-15 Credits.

BUSN 199. Special Topics. 1-5 Credits.

BUSN 291. Seminar. 1-3 Credits.

BUSN 292. Study Abroad. 1-15 Credits.

BUSN 294. Individual Study. 1-3 Credits.

BUSN 296. Field Experience. 1-15 Credits.

BUSN 299. Special Topics. 1-5 Credits.

BUSN 301. Organizational Citizen. 0 Credits.

Demonstrate ability to become an effective organizational citizen. Prereq: BUSN 189. Pass/Fail grading.

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, Jr or Sr classification, 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, Jr or Sr classification, 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, Junior or Senior classification, and a 2.50 minimum NDSU grade point average. Cross-listed with AGE 347.

BUSN 379. Study Tour Abroad. 1-6 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Junior or Senior classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 392. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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 415. Small Business Institute. 3 Credits.

Practical application of classroom learning in a supervised consulting project with a local business. Teams analyze actual business problems, and develop recommendations for the client. 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 432. Business Law II-Business Organization and Commercial Transactions. 3 Credits.

A study of advanced topics in business organizations and commercial transactions: the law of sales, commercial paper, agency, business organizations, secured transactions, bankruptcy, securities regulation, and accountants' liability. Prereq: BUSN 431 or 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 632.}.

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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. F, S, Su. {Also offered for graduate credit - see BUSN 674.}.

BUSN 487. Managerial Economics. 4 Credits.

Use of decision science techniques such as statistical and numerical analysis and optimization to study profit, demand and supply, cost and production, market structure, pricing practices, and the impact of government regulations on management decisions. Prereq: MGMT 320, ECON 201, ECON 202, MATH 144 or MATH 146. Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 489. Strategic Management. 4 Credits.

Integration and application of management, marketing, and finance principles in written and oral case analysis of organizations. Consideration of global, ethical, and current social issues. Capstone for Accounting, Business Administration, and Management Information Systems majors. Prereq: FIN 320, MGMT 320, MRKT 320, Senior standing. Co-Req: BUSN 430.

BUSN 491. Seminar. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 492. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

BUSN 632. Business Law II-Business Organization and Commercial Transactions. 3 Credits.

A study of advanced topics in business organizations and commercial transactions: the law of sales, commercial paper, agency, business organizations, secured transactions, bankruptcy, securities regulation, and accountants' liability. Prereq: BUSN 630. {Also offered for undergraduate credit - see BUSN 432.}.

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. Study Abroad. 1-15 Credits.****BUSN 696. Special Topics. 1-5 Credits.****BUSN 780. Economics for Managers in the Global Economy. 3 Credits.**

This course will provide students with an understanding of the microeconomic tools for managerial decision making as well as an understanding of the macroeconomic environment in which firms operate. The course will include an emphasis on international issues and their impacts on the firm, such as international trade, international investment, and foreign exchange risk.

BUSN 789. Advanced Strategic Management. 3 Credits.

Value-centered enterprise leadership, integrating functional business expertise into strategy formulation and implementation. Prereq: FIN 740, MGMT 750, MGMT 751, MRKT 760.

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. 2 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. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.

CFS 391. Seminar. 1-3 Credits.

CFS 392. Study Abroad. 1-15 Credits.

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. 2 Credits.

Thermodynamics, materials and energy balance, fluid flow, heat transfer, heat exchange, all related to food processing. Prereq: MATH 147, PHYS 211, PHYS 211L. {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. Prereq: SAFE 470. Cross-listed with SAFE 452 and AGECE 452. {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 464. Food Analysis. 3 Credits.

Principles, applications, and practice of methods for quantitative determination of food components. 2 lectures, 1 three-hour laboratory. Recommended Prereq: BIOC 460, CFS 460. {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 474. Sensory Science of Foods. 2 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: CFS 460 and 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. Study Abroad. 1-15 Credits.****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. 2 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 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 674. Sensory Science of Foods. 2 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. Prereq: CFS 660. {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. Study Abroad. 1-15 Credits.**

Pre-arranged study at accredited foreign institutions or in approved study abroad programs.

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 AGECE 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.

Physicochemical, 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.

Physicochemical, 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 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 or MATH 107.

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 or MATH 107. (ND:LABSC) CCN.

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.

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.

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 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 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.

CHEM 151. Principles of Chemistry II. 3 Credits.

Liquids and solids, equilibrium, kinetics, thermodynamics, acids and bases, oxidation-reduction chemistry, electrochemistry. Coreq: 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 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. Also listed under BIOC 260.

CHEM 291. Seminar. 1-3 Credits.**CHEM 292. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.**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. Study Abroad. 1-15 Credits.****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 431L. Coreq: CHEM 425.

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 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 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 432L. Analytical Chemistry II Laboratory. 1 Credit.

Theory and application of modern instrumental techniques, including spectroscopy and electrochemistry. Prereq: CHEM 431L. {Also offered for graduate credit - see CHEM 632L.}.

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 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. Study Abroad. 1-15 Credits.****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 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 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 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 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. Inorganic Chemistry II. 3 Credits.

Molecular orbital and valence bond theories, inorganic reactions and mechanisms. Prereq: CHEM 625.

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. Electrochemistry. 4 Credits.

Theory and application of modern electrochemical methods, including potentiometry, voltammetry, electrochemical impedance spectroscopy, kinetics and mechanisms of electrode processes, corrosion, simulation techniques, and instrumentation. Prereq: CHEM 632.

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. Intermediate Physical Chemistry. 3 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 899. Doctoral Dissertation. 1-15 Credits.**

Civil Engineering (CE)

CE 111. Introduction to Civil Engineering. 2 Credits.

Introduction to duty and role of the professional engineer, phases of engineering design activities, computer applications with word processing and spreadsheets. 2 one-hour lectures. S.

CE 194. Individual Study. 1-3 Credits.**CE 196. Field Experience. 1-15 Credits.****CE 199. Special Topics. 1-5 Credits.****CE 204. Surveying. 4 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, 2 three-hour laboratories. Prereq: MATH 105. F, S.

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. This required course will be taught at sophomore level to get students properly prepared for CE courses. Prereq: Sophomore standing in CE program.

CE 291. Seminar. 1-3 Credits.**CE 292. Study Abroad. 1-15 Credits.****CE 294. Individual Study. 1-5 Credits.****CE 299. Special Topics. 1-5 Credits.****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 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 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. Study Tour Abroad. 1-6 Credits.**CE 391. Seminar. 1-3 Credits.****CE 392. Study Abroad. 1-15 Credits.****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 one-hour lectures, 1 three-hour session. Prereq: ME 223. S {Also offered for graduate credit - see CE 630.}.

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: MATH 266. {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 451. Advanced Surveying. 2 Credits.

Property description and legal land surveys. Astronomical observations to establish position and direction. State plane coordinates. 2 one-hour lectures. Prereq: CE 204. {Also offered for graduate credit - see CE 651.}.

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 and junior or senior standing. {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 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. {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. {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: Senior standing. F, S.

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. Study Abroad. 1-15 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 one-hour lectures, 1 three-hour session. S {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 651. Advanced Surveying. 2 Credits.

Property description and legal land surveys. Astronomical observations to establish position and direction. State plane coordinates. 2 one-hour lectures. {Also offered for undergraduate credit - see CE 451.}.

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 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 affined 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 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 768. Advanced Water and Wastewater Laboratory. 3 Credits.

Studies on selected processes, efficiency and evaluation of water and wastewater treatment. Selected methods of water and wastewater analyses. 2 one-hour lectures, 1 three-hour laboratory.

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 775. Industrial Waste Management. 3 Credits.

Regulations and standards on industrial pollution control, industrial waste characteristics, industrial waste management strategies, and waste treatment methods. Prereq: CE 610.

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. Public Infrastructure Management and Constructure. 3 Credits.

Management and construction of public infrastructure including streets, highways, and sidewalks; public transportation; street lighting and traffic control systems; potable water; wastewater and drainage; parks, recreation facilities, solid waste handling and disposal, and others. Prereq: CE 619, CE 656.

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 899. Doctoral Dissertation. 1-15 Credits.**

Classical Languages (CLAS)

CLAS 101. First-Year Latin I. 4 Credits.

Introduction to forms, syntax, and vocabulary of classical Latin.

CLAS 102. First-Year Latin II. 4 Credits.

Introduction to forms, syntax, and vocabulary of classical Latin.

CLAS 151. First-Year Greek I. 4 Credits.

Introduction to forms, syntax, and vocabulary of Attic Greek along with selected readings.

CLAS 152. First-Year Greek II. 4 Credits.

Introduction to forms, syntax, and vocabulary of Attic Greek along with selected readings.

CLAS 180. Scientific Term: Greek & Latin. 2 Credits.

Brief survey of prefixes, suffixes, and roots from Greek and Latin, which form the technical vocabulary for science and medicine.

CLAS 194. Individual Study. 1-5 Credits.**CLAS 196. Field Experience. 1-15 Credits.****CLAS 199. Special Topics. 1-5 Credits.****CLAS 201. Second-Year Latin I. 3 Credits.**

Designed to form a transition from introductory material to the Latin authors. Prereq: CLAS 102.

CLAS 202. Second-Year Latin II. 3 Credits.

Designed to form a transition from introductory material to the Latin authors. Prereq: CLAS 201.

CLAS 251. Second-Year Greek I. 3 Credits.

Introduction to Koine Greek as found in the New Testament. Prereq: CLAS 152.

CLAS 252. Second-Year Greek II. 3 Credits.

Readings from selected classical Attic Greek authors. Prereq: CLAS 251.

CLAS 289. Biblical Hebrew I. 3 Credits.

Fundamentals of Hebrew script, grammar, and syntax. Includes selected readings from Biblical prose.

CLAS 290. Biblical Hebrew II. 3 Credits.

Fundamentals of Hebrew script, grammar, and syntax. Includes selected readings from Biblical prose.

CLAS 291. Seminar. 1-3 Credits.

CLAS 294. Individual Study. 1-5 Credits.

CLAS 299. Special Topics. 1-5 Credits.

CLAS 350. Glory of Greece. 3 Credits.

History of the ancient Greeks, their literature, politics, customs, art, and architecture.

CLAS 360. Grandeur Of Rome. 3 Credits.

History of ancient Rome, its literature, politics, customs, art, and architecture.

CLAS 361. Cicero. 3 Credits.

Study of the life and times of Cicero through selections from his letters, speeches, and philosophical essays. Prereq: CLAS 202.

CLAS 362. Virgil. 3 Credits.

Study of the poetry of Virgil with a concentration on the Aeneid. Prereq: CLAS 202.

CLAS 363. Advanced Latin Prose. 3 Credits.

Readings from Roman historians and other writers of Latin prose. Prereq: CLAS 202.

CLAS 364. Advanced Latin Poetry. 3 Credits.

Readings from Catullus, Horace, Ovid, and other Latin poets. Prereq: CLAS 202.

CLAS 370. Classical Mythology. 3 Credits.

Study of the gods and heroes of the Greeks and Romans as found in classical and modern literature, sculpture, and painting.

CLAS 379. Study Tour Abroad. 1-6 Credits.

CLAS 391. Seminar. 1-3 Credits.

CLAS 392. Study Abroad. 1-15 Credits.

CLAS 394. Individual Study. 1-5 Credits.

CLAS 399. Special Topics. 1-5 Credits.

CLAS 451. Advanced Greek Prose. 3 Credits.

Readings from Classical Greek philosophers, historians, and orators in the original. Prereq: CLAS 252.

CLAS 452. Greek Tragedy. 3 Credits.

Appreciation of Greek drama through reading selections from Aeschylus, Sophocles, and Euripides in the original. Prereq: CLAS 252.

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. Study Abroad. 1-15 Credits.

CPM 294. Individual Study. 1-5 Credits.

CPM 299. Special Topics. 1-5 Credits.

CPM 379. Study Tour Abroad. 1-6 Credits.

CPM 391. Seminar. 1-3 Credits.

CPM 392. Study Abroad. 1-15 Credits.

CPM 394. Individual Study. 1-5 Credits.

CPM 399. Special Topics. 1-5 Credits.

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. Recommended Prereq: CHEM 342. {Also offered for graduate credit - see CPM 673.}.

CPM 474. Coatings I. 3 Credits.

Synthesis of resins used in coatings systems, structure-property relationships for polymer binder systems, crosslinking and film formation concepts, solvents and other materials in coatings. Recommended Prereq: CHEM 342. {Also offered for graduate credit - see CPM 674.}.

CPM 475. Coatings II. 3 Credits.

Materials science of polymeric coatings, including their components, formulation, design, testing and application. Specialized topics include corrosion, color, appearance and adhesion. Recommended 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. Study Abroad. 1-15 Credits.****CPM 494. Individual Study. 1-5 Credits.****CPM 496. Field Experience. 1-15 Credits.****CPM 499. Special Topics. 1-5 Credits.****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. Coatings I. 3 Credits.

Synthesis of resins used in coatings systems, structure-property relationships for polymer binder systems, crosslinking and film formation concepts, solvents and other materials in coatings. {Also offered for undergraduate credit - see CPM 474.}.

CPM 675. Coatings II. 3 Credits.

Materials science of polymeric coatings, including their components, formulation, design, testing and application. Specialized topics include corrosion, color, appearance and adhesion. Recommended 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 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 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.**

Communication (COMM)

COMM 109. Communicating with Confidence. 1 Credit.

Designed for students who are reluctant to enroll in speech due to high speech anxiety. Focused on discussing causes of speech anxiety and practicing anxiety-reducing techniques. Does not satisfy any requirements for graduation.

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.

COMM 112. Understanding Media and Social Change. 3 Credits.

Exploration of the purpose, function, and impact of media on society. Mass communication majors must earn a grade of B or better.

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. Speech communication majors must earn a grade of B or better.

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 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 public relations. Journalism majors must earn a grade of B or better. 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. Speech communication majors must earn a grade of B or better.

COMM 214. Persuasive Speaking. 3 Credits.

Elements of persuasive speaking with focus on evaluating information directed at the consumer. Includes strategies of altering attitudes, beliefs, values, and behavior. Prereq: COMM 110.

COMM 216. Intercultural Communication. 3 Credits.

Exploration of the definition, models, and verbal processes of communication between different cultural groups.

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 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 271. Listening and Nonverbal Communication. 3 Credits.

Theory and practice of effective listening; nonverbal aspects of human communication.

COMM 291. Seminar. 1-3 Credits.**COMM 292. Study Abroad. 1-15 Credits.****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 312. Oral Performance Studies. 3 Credits.

Study and practice of the principles involved in oral performance. Includes the development of vocal qualities and articulation, as well as the analysis of literary texts representing a variety of genres and formats of interpretation. Prereq: COMM 110. Restricted to Communication professional majors and minors.

COMM 313. Editorial Processes. 3 Credits.

Principles of print media copy-editing, headline composition, publication design, photo editing, and computer editing. Prereq: COMM 200. 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: completion of pre-communication degree requirements.

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 Analysis. 3 Credits.

Overview and application of basic methods used in communication analysis. Mass Communication and Speech Communication majors must earn a grade of B or better. Restricted to Communication professional majors and minors.

COMM 321. Introduction to Communication Theory. 3 Credits.

Major theoretical approaches to the study of communication from social scientific and humanistic traditions. Restricted to Communication professional majors and minors.

COMM 325. Applied Research Methods. 4 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, laboratory. Co-req or Prereq: STAT 330. Cross-listed with POLS 325 and CJ 325.

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. Prereq: COMM 345.

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 348. Documentary & Commercial Production. 3 Credits.

Advanced video editing and shooting skills for production of mini-documentaries, commercials, promo's, video news releases (VNRs), public service announcements (PSAs), and music videos. Prereq: COMM 345.

COMM 349. 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 learn basic production skills including all areas of study production by working in the SU TV studio. Prereq: COMM 345.

COMM 362. Principles of Design For Print. 3 Credits.

Applications of various design principles and pagination techniques to cognitive problem solving involved in developing material for publication. 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: COMM 200 and completion of pre-Communication degree requirements.

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. Advertising Media Planning. 3 Credits.

This course introduces students to the basic concepts of media planning and buying in advertising. Emphasis is placed on strategic approaches to the media placement process across all forms of media. Prereq: COMM 375. Restricted to Communication professional majors and minors.

COMM 379. Study Tour Abroad. 1-6 Credits.**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 381. Patient-Provider Communication. 3 Credits.

This course is designed to provide verbal and nonverbal strategies to improve patient-provider interaction during the medical visit and subsequent sessions involving the diagnosis and treatment of health-related conditions. Restricted to Communication professional majors and minors, Allied Sciences, Health, Nutrition, and Exercise Science, Nursing, Pharmaceutical Sciences, Pharmacy Practice, and Psychology majors only.

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 386. Organizational Interviewing. 3 Credits.

This course goes beyond just practicing interviewing skills to learn the theories and research that back the methods taught. Management Communication majors will learn about conducting job interviews and performance reviews. For Public Relations majors, probing, survey, and persuasive interviews will be particularly useful. Prereq: COMM 383.

COMM 391. Seminar. 1-5 Credits.**COMM 392. Study Abroad. 1-15 Credits.****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 402. Contemporary Rhetoric. 3 Credits.

Examination of the use of public address in the contemporary culture to identify styles of usage and ethical practices employed by communicators. Prereq: Junior standing. 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. Prereq: COMM 310. Restricted to Communication professional majors and minors. {Also offered for graduate credit - see Comm 621.}.

COMM 425. Specialty Writing. 3 Credits.

Methods and practice of writing features and opinion for print publications. Prereq: COMM 310. 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 433. Legal Communication. 3 Credits.

Verbal and nonverbal factors in the legal interview, negotiation and conflict resolution, jury selection, opening statements, witness examination, closing arguments, and jury deliberation. Designed for students interested in applied communication theory or pre-law. Restricted to Communication professional majors and minors.

COMM 434. Communication Law. 3 Credits.

Exploration of speech and press protections of the First Amendment; includes libel, privacy, electronic media regulation, and speech regulation. Restricted to Communication professional majors and minors. {Also offered for graduate credit - see Comm 634.}.

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 436. Issues in Mass Communications. 3 Credits.

Studies of mass communication topics in interaction with social, cultural, political, and economic realities. Media impact on national life and thought. May be repeated. Prereq: Junior standing. Restricted to Communication professional majors and minors. {Also offered for graduate credit - see Comm 636.}.

COMM 442. Digital Media and Society. 3 Credits.

Explores the impact of technological developments on media and mediated culture.

COMM 443. Mass Media and Public Opinion. 3 Credits.

Overview of theories and methodologies used in the study of the role of mass media in attitude formation, attitude change, and public opinion. Prereq: Junior standing. Restricted to Communication professional majors and minors.

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.

Development of skills in the creation, critique, and analysis of television productions in the studio and in the field. May be repeated. Prereq: COMM 345. Restricted to Communication professional majors and minors.

COMM 451. Directing Forensics. 2 Credits.

Theory and practical strategies for coaching individual speaking events and debate at the high school or collegiate levels. Prereq: Junior standing. Restricted to Communication professional majors and minors. {Also offered for graduate credit - see Comm 651.}.

COMM 462. Web Database Programming. 3 Credits.

Introduces students to Web database concepts, design, normalization processes, and implementation. Prereq: COMM 260, 261. Restricted to Communication professional majors and minors.

COMM 465. Convergence Media. 3 Credits.

Exposure to advanced reporting and writing methods, multimedia journalism, and blog technology for converged media. Prereq: COMM 260, 261, 363 and admission to the professional Communication plan 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 370 or COMM 375. Restricted to Communication professional majors and minors. {Also offered for graduate credit - see Comm 672.}.

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 472. Restricted to Communication professional majors and minors.

COMM 474. Communication Campaigns. 3 Credits.

This course builds on the experience of other social science courses, and provides a foundation for purposive uses of communication to achieve pre-determined informational, attitudinal, and/or behavioral objectives.

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 COMM 377. Restricted to Communication professional majors and minors.

COMM 480. Health Communication II. 3 Credits.

Designed to introduce students to advanced theory and research in health communication. Course topics include interpersonal health communication, intervention design, and global perspectives on health communication. Prereq: COMM 380. 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. Prereq: COMM 110. Cross-listed with SAFE 485. Restricted to Communication professional majors and minors.

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 488. Social Influence and Organizational Change. 3 Credits.

Exploration of research and theory of social influence and change in organizations. Focus on interpersonal, group, and organizational influence processes and systems view of organizational change efforts. Prereq: COMM 383.

COMM 491. Seminar. 1-5 Credits.

Restricted to Communication professional majors and minors.

COMM 492. Study Abroad. 1-15 Credits.

Restricted to Communication professional majors and minors.

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 621. History of Journalism. 3 Credits.

The history and development of journalism as shaped by the political and social environment. {Also offered for undergraduate credit - see COMM 421.}.

COMM 634. Communication Law. 3 Credits.

Exploration of speech and press protections of the First Amendment; includes libel, privacy, electronic media regulation, and speech regulation. {Also offered for undergraduate credit - see Comm 434.}.

COMM 636. Issues in Mass Communication. 3 Credits.

Studies of mass communication topics in interaction with social, cultural, political, and economic realities. Media impact on national life and thought. May be repeated. {Also offered for undergraduate credit - see Comm 436.}.

COMM 651. Directing Forensics. 2 Credits.

Theory and practical strategies for coaching individual speaking events and debate at the high school or collegiate levels. {Also offered for undergraduate credit - see Comm 451.}.

COMM 672. Public Relations Campaigns. 3 Credits.

Social science research as applied to public relations, case study analysis, construction, and implementation of public relations campaigns. {Also offered for undergraduate credit - see Comm 472.}.

COMM 690. Graduate Seminar. 1-3 Credits.

COMM 693. Individual Study/Tutorial. 5.00 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 703. Advanced Research Methods in Communication II. 3 Credits.

Advanced research methods in communication; focus on action-oriented approaches to research. Prereq: COMM 701.

COMM 704. Qualitative Research Methods in Communication. 3 Credits.

Introduction to theory and practice of qualitative research in communication. Prereq: COMM 700.

COMM 705. Advanced Communication Theory. 3 Credits.

Provides doctoral students with a structured forum for discussion of communication theory and research. Prereq: COMM 711.

COMM 706. Advanced Interpersonal Communication. 3 Credits.

Interpersonal communication theory and research methods are developed from the perspectives of uncertainty reduction, conflict management, relationship reciprocity, constructivism, compliance gaining, discourse dominance, and relational dynamics.

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 708. Advanced Qualitative Methods in Communication Research. 3 Credits.

In-depth application of one of the methods used in qualitative communication research. Prereq: SOC 700.

COMM 710. Advanced Quantitative Methods in Communication Research. 3 Credits.

Application of quantitative methods to communication research, with an emphasis on testing theoretically driven hypotheses, operationalizing variables, designing valid and reliable measures, implementing a research design, analyzing data, and reporting findings. Prereq: SOC 701, STAT 725.

COMM 711. Communication Theory. 3 Credits.

Major theoretical approaches to the study of communication from social scientific and humanistic traditions.

COMM 714. Marriage & Family Communication. 3 Credits.

Focuses on the dynamics of marriage and family communication. Theoretical frameworks include: symbolic interactionism; social constructionism; relational dialectics; social penetration; developmental theory; and relational culture. Prereq: COMM 700.

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 721. Intercultural Communication. 3 Credits.

Advanced theories of verbal and nonverbal behavior, attitudes, and communication styles that affect interaction between cultural groups.

COMM 725. Communication and Change. 3 Credits.

Investigation of the diffusion process and related variables affecting an innovation's rate of adoption.

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 752. Theory of Argument. 3 Credits.

Philosophy and theory of argumentation; including exploration of analytical methods employed in argumentation.

COMM 761. Survey of Rhetorical Theory. 3 Credits.

Historical-descriptive examination of rhetorical theory from the classical through modern periods. Prereq: Graduate standing.

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 780. Health Communication. 3 Credits.

Advanced theories and principles of communication in the health professions.

COMM 782. Theories of Persuasion. 3 Credits.

Survey of the theories related to persuasion, attitudes, and values of societal groups, and the assessment of attitudes and values held by the public.

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 784. Advanced Organizational Communication II. 3 Credits.

Study of the structure and function of communication interaction in formal organizations and survey of methods of analysis including the communication audit. Also includes models of introducing innovations.

COMM 785. Advanced Crisis Communication in Public Relations. 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. Cross-listed with SAFE 785.

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 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 899. Doctoral Dissertation. 1-15 Credits.

Community Development (CED)

CED 709. Community Development Orientation. 2 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 725. Wellness in Native Communities. 1 Credit.

Highlights health care issues challenging Native communities and identifies strategies and practices to address those challenges. Prereq: CED 709.

CED 726. Youth Development in Native Communities. 1 Credit.

Contemporary issues facing Native youth, including demographics, early parenting, juvenile justice, education, health, employment, and youth-elder connections. Prereq: CED 709.

CED 727. Indian Country Agriculture and Natural Resources. 1 Credit.

Explores the impact of structural inequality, globalization, and sovereignty on planning, sustainability, and development of agriculture and natural resources on Native American reservations. Prereq: CE 709.

CED 728. Role of Tribal Colleges in Economic Development. 1 Credit.

Examines the tribal college model of economic development using a social capital analytical framework. 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 735. Policy and Politics of Coastal Areas. 3 Credits.

This course explores public policy and programs pertaining to America's coastlines as it pertains to community economic development. 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 742. Economic and Fiscal Impact Analysis. 1 Credit.

Examines the underlying concepts of and the tools for conducting community economic and fiscal impact analysis. Prereq: CED 709.

CED 743. Cost-Benefit Analysis. 1 Credit.

This course examines cost-benefit analysis, cost effectiveness, and cost-utility analysis in the context of community economic development. Prereq: CED 709.

CED 744. Local Economic Analysis. 1 Credit.

This course offers descriptive tools of community economic analysis to assess the current or past state of a community's economy, to predict the future of that economy, and to help leaders make effective economic decisions. 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 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. Microcomputer Packages. 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 116, not both.

CSCI 116. Business Use of Computers. 4 Credits.

Exploration of how microcomputers are used in business. Use of word processing, spreadsheet, database, graphing, and telecommunication applications. Credit awarded only for CSCI 114 or CSCI 116, not both.

CSCI 122. Visual BASIC. 3 Credits.

Introduction to programming in the BASIC/Visual BASIC language.

CSCI 125. Beginning COBOL. 3 Credits.

Introduction to programming in the COBOL language.

CSCI 126. Beginning FORTRAN. 3 Credits.

Introduction to programming in the FORTRAN language. Prereq: MATH 103 or MATH 107.

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.

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 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. Study Abroad. 1-15 Credits.****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. Software Development for Games. 3 Credits.

This course provides students with an understanding of agile software development. Students work in small teams to use an agile methodology to develop a computer game. Prereq: CSCI 213.

CSCI 316. System Testing and Maintenance. 3 Credits.

Introduction to the back end of the software development life cycle. Includes various modern concepts, techniques, and tools for testing and maintaining software systems. Prereq: CSCI 315.

CSCI 336. Theoretical Computer Science II. 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 335.

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 213.

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 213.

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. Prereq: CSCI 213. Cross-listed with ECE 374.

CSCI 379. Study Tour Abroad. 1-6 Credits.**CSCI 391. Seminar. 1-3 Credits.****CSCI 392. Study Abroad. 1-15 Credits.****CSCI 394. Individual Study. 1-5 Credits.****CSCI 397. Fe/Coop Ed/Internship. 1-4 Credits.****CSCI 399. Special Topics. 1-5 Credits.****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 161. {Also offered for graduate credit - see CSCI 613.}

CSCI 415. 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.

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 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 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 454. 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 453, STAT 367. {Also offered for graduate credit - see CSCI 654.}

CSCI 458. Microcomputer Graphics. 3 Credits.

Information on the techniques by which computers generate images of 2 and 3D objects. Principles to guide the use of computer graphics to enhance human-computer interaction. Prereq: CSCI 372, MATH 146 or MATH 165. {Also offered for graduate credit - see CSCI 658.}

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. {Also offered for graduate credit - see CSCI 659.}

CSCI 460. Dynamic Programming. 3 Credits.

Basic principles and algorithms of dynamic programming as applied to sequential decision problems in CS and OR. Prereq: MATH 166. {Also offered for graduate credit - see CSCI 660.}

CSCI 462. Mobile and Wireless Networks. 3 Credits.

Fundamental concepts and technologies of mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. Prereq: CSCI 366 and CSCI 372. {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: CSCI 372.

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 476. Computer Forensics. 3 Credits.

This course 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 474 or instructor approval. {Also offered for graduate credit - see CSCI 676.}

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 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. Study Abroad. 1-15 Credits.****CSCI 494. Individual Study. 1-5 Credits.****CSCI 496. Field Experience. 1-15 Credits.****CSCI 499. Special Topics. 1-5 Credits.****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 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 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 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 658. Microcomputer Graphics. 3 Credits.

Information on the techniques by which computers generate images of 2 and 3D objects. Principles to guide the use of computer graphics to enhance human-computer interaction. {Also offered for undergraduate credit - see CSCI 458.}.

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 660. Dynamic Programming. 3 Credits.

Basic principles and algorithms of dynamic programming as applied to sequential decision problems in CS and OR. {Also offered for undergraduate credit - see CSCI 460.}.

CSCI 662. Mobile and Wireless Networks. 3 Credits.

Fundamental concepts and technologies of mobile and wireless networks. Topics include wireless transmission characteristics, mobility management, wireless local area networks, ad hoc and sensor networks, and cellular networks. {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 676. Computer Forensics. 3 Credits.

This course 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 476.}.

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 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 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 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: Pre-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, 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. Study Abroad. 1-15 Credits.****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, CM&E 260 or CE 316, admission to the Construction Management or Construction Engineering program and junior 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. Study Tour Abroad. 1-6 Credits.**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. Prereq: CM&E 380, admission to the Construction Management or Construction Engineering program and at least senior standing. F {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 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. F.

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 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, BIM, and other software programs to prepare a bid proposal and an on-site construction management plan for a building project. Prereq: Admission to the Construction Management or Construction Engineering program and at least senior standing.

CM&E 489. Construction Design Capstone. 3 Credits.

This course focuses on the design and construction aspects of an actual construction project. Prereq: Senior standing in Construction Engineering.

CM&E 491. Seminar. 1-5 Credits.**CM&E 492. Study Abroad. 1-15 Credits.****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 693. Individual Study. 1-5 Credits.**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 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. Dynamics Of Self. 3 Credits.

Application of personality theory and the life stages to human behavior 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.

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.

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 733. Marital Counseling. 3 Credits.

Survey of marital counseling theories and techniques; analyses of dysfunctional communications. 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 767. 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 and completion of master's program courses.

CNED 770. 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 779. 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 787. 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 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 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 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 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 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 225. Punishment and the Death Penalty. 1 Credit.

Review of philosophical principles, policies, and procedures of punishment as used in the death penalty practices of the U.S.

CJ 226. Criminal Investigation. 2 Credits.

Researches the process of gathering information and evidence in solving crimes. Focus on the role of evidence gathering and its importance to prosecuting cases and administering justice.

CJ 230. Criminology and Criminal Law. 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 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 325. Applied Research Methods. 4 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, laboratory. Co-req or Prereq: STAT 330. Cross-listed with COMM 325 and POLS 325.

CJ 327. Drugs and the Criminal Justice System. 3 Credits.

Overview of drug use in historical and social contexts. Covers alcohol and other controlled substances, paying attention to institutional, economic, legal and political implications of past and future drug consuming practices and policies. Prereq: admission to CJ professional program.

CJ 330. Criminal Law and Procedure. 2 Credits.

Examination of criminal law and procedure including search and seizure laws, rights of defendants and victims, and due process in criminal law. Prereq: admission to the professional program in Criminal Justice.

CJ 354. Media, Crime and Justice in America. 2 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. Study Tour Abroad. 1-6 Credits.**CJ 391. Seminar. 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: Junior standing and 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 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. Women and Minorities in Criminal Justice. 3 Credits.

Analysis of roles and contributions of women and minorities in criminal justice system as offenders, victims and practitioners. Examines effect of court decisions, rule-making and contemporary criminal justice practices on women and ethnic minorities. Prereq: CJ 325 or POLS 325 and admission to the Criminal Justice professional program.

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 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 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. Criminogenic Commodities. 3 Credits.

Examination of the role of drugs, guns, and gangs in contributing to crime. Analysis of the laws pertaining to drugs, guns, and gangs and their impact on criminality. Prereq: Graduate standing in Criminal Justice or instructor approval.

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 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 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 291. Seminar. 1-3 Credits.**ECON 292. Study Abroad. 1-15 Credits.****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 146.

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 379. Study Tour Abroad. 1-6 Credits.**ECON 391. Seminar. 1-3 Credits.****ECON 392. Study Abroad. 1-15 Credits.****ECON 394. Individual Study. 1-3 Credits.****ECON 399. Special Topics. 1-5 Credits.****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 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. Prereq: ECON 201, MATH 146 or MATH 165, STAT 330 or STAT 367. Recommended prereq: ECON 341 or BUSN 487. {Also offered for graduate credit - see ECON 640.}

ECON 456. History of Economic Thought. 3 Credits.

Development of economic thought from the mercantilists to Keynesian economics. Prereq: ECON 341 or BUSN 487 and ECON 324 or ECON 343. {Also offered for graduate credit - see ECON 656.}

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 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. Study Abroad. 1-15 Credits.****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 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 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 656. History of Economic Thought. 3 Credits.

Development of economic thought from the mercantilists to Keynesian economics. {Also offered for undergraduate credit - see ECON 456.}.

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 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 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 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 122. Interpersonal Relationships. 1 Credit.

Study of the development of interpersonal relationships with a focus on listening and sharing in an experiential manner.

EDUC 123. Study Skills. 1 Credit.

Assistance in the development of study skills necessary for academic achievement through learning and practice.

EDUC 124. Career Planning. 1 Credit.

Study of the world of work with attention to self-assessment, vocational choice, and career planning.

EDUC 125. Assertiveness Training. 1 Credit.

Behavioral approach to assertiveness combining a cognitive approach with role-play and discussion.

EDUC 126. The Art of Living. 1 Credit.

This course is designed to help students transition successfully into adulthood. The course focuses on helping students learn about themselves and the world around them, about how to adapt to the inevitable shortcomings and failures of life, and how to define and plan for a good and/or successful life.

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. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.

EDUC 391. Seminar. 1-3 Credits.

EDUC 392. Study Abroad. 1-15 Credits.

EDUC 394. Individual Study. 1-5 Credits.

EDUC 399. Special Topics. 1-5 Credits.

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. Special Education: Exceptionalities and Education. 2 Credits.

This course will address the historical implications of the concept of disability and what it means within education. Applications and strategies for classroom teachers will be addressed. 10 hours of field experience is required. Prereq: EDUC 321 and EDUC 322 and admission to the School of Education.

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 480. Stress Management. 2 Credits.

The dynamics of stress, sources and symptoms of stress, and stress management techniques will be presented and practiced.

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. Study Abroad. 1-15 Credits.****EDUC 494. Individual Study. 1-5 Credits.****EDUC 496. Field Experience. 1-15 Credits.****EDUC 499. Special Topics. 1-5 Credits.****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. Special Education: Exceptionalities and Education. 2 Credits.

This course will address the historical implications of the concept of disability and what it means within education. Applications and strategies for classroom teachers will be addressed. 10 hours of field experience is required. Prereq: EDUC 321 and EDUC 322 and admission to the School of Education.

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. Study Abroad. 1-15 Credits.**

Pre-arranged study at accredited foreign institutions or in approved study abroad programs.

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 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. 4 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 718. Community Education. 2 Credits.

Study of the theory base on which community education is founded. Consideration is given to implementing the concept in the community with available resources.

EDUC 720. Supervision of Student Teachers. 2 Credits.

Planning and carrying out effective supervision techniques when supervising student teachers in respective subjects.

EDUC 722. Instructional Systems, Media, Materials. 2 Credits.

Preparation of instructional systems in support of a variety of teaching techniques and alternative media approaches.

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 729. Multimodal Education Delivery Systems. 3 Credits.

Examines theoretical underpinnings, instructional design models, and programmatic approaches to effective planning, design, organization, evaluation and management in multimodal education delivery systems. 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 Organizational Structure of Schools. 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. 4 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. 2 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. 4 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. 2 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 737. Helping Relationship and the Elderly. 3 Credits.

The theoretical foundations and the techniques of the helping relationship between the helper and people of advanced age will be studied and applied.

EDUC 738. Administration of Elementary Schools. 2 Credits.

Common elements of leadership as they apply to the principalship. Consideration of practical applications in an elementary school setting. 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 769. Politics and Policy Analysis in Education. 2 Credits.

The purpose of this course is to examine political and policy development in American public education in order to understand current local, state, and national issues.

EDUC 775. Content Area Reading. 2 Credits.

Examination of content, instructional methodologies, and evaluation techniques for reading in content classes.

EDUC 777. Tort Liability. 2 Credits.

Examination of the legal liability of teachers, administrators, and public school boards for injurious intentional or unintentional acts. Prereq: EDUC 731.

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 781. Teaching and Curriculum. 3 Credits.

Overview of recent research on teaching, learning, and curriculum. Special attention given to contemporary theories on teaching models that enhance student understanding. May be repeated for credit.

EDUC 782. Supervisory and Administrative Theories. 4 Credits.

Study of management models and techniques, needs assessment, goal setting, planning and evaluation systems, and decision-making problems as they relate to the school improvement process. Prereq: EDUC 732.

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 786. School Facility Planning. 2 Credits.

Overview of the principles in planning, construction, and maintenance of school buildings. Visits to educational facilities and the assessment of school buildings.

EDUC 787. Issues In Education. 2 Credits.

This course delves into the issues of why a person would pursue a doctoral degree in light of the current issues facing educators. Helps define a professional course of study available in respect to educational issues. Leads to studying creators and leaders in different realms by people who have special interest in creativity and ethical pursuits.

EDUC 788. School Finance and Business Management. 4 Credits.

Overview of school fund revenues and expenditures pertaining to local, state, and federal funding. Includes in-depth study of the practices of school business administration pertaining to all fund activities in instruction and ancillary operations.

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. Indiv 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 797. Master's Paper. 1-3 Credits.****EDUC 798. Master's Thesis. 1-10 Credits.****EDUC 798S. Specialist Field Study. 1-3 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 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 841. 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 doctoral program.

EDUC 842. 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 doctoral program.

EDUC 843. 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 doctoral program.

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 861. Curriculum and Instruction Development. 3 Credits.

A five-phase model will be compared and contrasted to provide the skill and knowledge necessary to establish a systematic curriculum and instructional development. Prereq: Admission to doctoral program.

EDUC 862. Instructional Models. 2 Credits.

Investigation of current practices and trends in instructional models. 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. 2 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 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. F.

ECE 173. Introduction to Computing. 3 Credits.

Programming in a high level language with applications to engineering computation, analysis, and design. 3 lectures, 1 recitation. Prereq: MATH 105. F, S.

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. F, S.

ECE 291. Seminar. 1-3 Credits.**ECE 292. Study Abroad. 1-15 Credits.****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. F, S.

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. F, S.

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. Coreq: ECE 303. F, S.

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. F, S.

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. F, S.

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. F, S.

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. S.

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. F, S.

ECE 343. Signals & Systems. 4 Credits.

Discrete-time and continuous-time signals and systems. Linearity, frequency response, difference and differential equations, transform techniques. 4 lectures. Prereq: EE 206, ECE 320 and ECE 311 or MATH 266. F, S.

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. F, S.

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.

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. F, S.

ECE 379. Study Tour Abroad. 1-6 Credits.**ECE 391. Seminar. 1-3 Credits.****ECE 392. Study Abroad. 1-15 Credits.****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. S.

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. F.

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. S.

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 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 S/2 {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. S {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 321. {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 321, ECE 351. F/2 {Also offered for graduate credit - see ECE 625.}

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. S/2 (odd years). 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. F {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. S {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. F {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. S {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. F, S {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. F {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. S/2 {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. F/2 {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. F/2 {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. F {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. F {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. S.

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.

ECE 475. 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. Prereq: ECE 173, ECE 275. F.

ECE 483. Instrumentation for Engineers. 3 Credits.

Study of instrumentation including design, fabrication, and application. Prereq: Senior standing. F {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. F {Also offered for graduate credit - see ECE 685.}.

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. S {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. Study Abroad. 1-15 Credits.****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 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. S/2 {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. S/2 (odd years). 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 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 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 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 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 773. 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. S.

ECE 774. 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.

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 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. F,S.

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. Homeland Security: An Exploration. 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 261. 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 262. 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 263. 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 264. 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 291. Seminar. 1-5 Credits.

EMGT 299. Special Topics. 1-5 Credits.

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. International Emergency Management. 3 Credits.

Explores hazard events, emergency management processes and structures, and how they vary around the world. Prereq: EMGT 101. {Also offered for graduate credit - see EMGT 625.}.

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. Vulnerability and Functional Needs in Emergency Management. 3 Credits.

Using the vulnerability theory as a framework, this course examines research related to groups that have been historically labeled "special populations" and how emergency management might address their functional needs. Prereq: EMGT 101. {Also offered for graduate credit - see EMGT 645.}.

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 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. Cross-listed with ANTH 464. {Also offered for graduate credit - see EMGT 664.}.

EMGT 481. Disaster Analysis. 3 Credits.

Examination of natural and human-made disasters from a multidisciplinary perspective. {Also offered for graduate credit - see EMGT 681.}.

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 625. International Emergency Management. 3 Credits.

Explores hazard events, emergency management processes and structures, and how they vary around the world. {Also offered for undergraduate credit - see EMGT 425.}.

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 645. Vulnerability and Functional Needs in Emergency Management. 3 Credits.

Using the vulnerability theory as a framework, this course examines research related to groups that have been historically labeled "special populations" and how emergency management might address their functional needs. {Also offered for undergraduate credit - see EMGT 445.}.

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 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. Cross-listed with ANTH 664. {Also offered for undergraduate credit - see EMGT 464.}.

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 120. Introduction to Engineering. 3 Credits.

Introduction to Engineering is a foundation course for the Project Lead the Way Engineering curriculum. Students will be exposed to the design process, collaboration, research and analysis, communication, technical documentation and engineering standards.

ENGR 121. Principles of Engineering. 3 Credits.

This course is the second foundation course in the Project Lead the Way sequence. This course prepares students for colleges' majors in engineering or engineering technology fields. Course encompasses energy, power, materials and structures, control systems, statistics and kinematics. Prereq: ENGR 120.

ENGR 122. Digital Electronics. 3 Credits.

This course provides a foundation for students who are interested in electrical engineering, electronic, or circuit design in the Project Lead The Way program. Students study topics like combinatorial and sequential logic and are exposed to circuit design tools used in industry. Prereq: ENGR 120.

ENGR 123. Civil Engineering and Architecture. 3 Credits.

This course is intended to serve as a specialization course in the Engineering sequence for Project Lead the Way. Students will use rivet and auto desk to solve and make problems in the course. This includes a long term project that involves the development of a local property site. Prereq: ENGR 120.

ENGR 124. Biotechnical Engineering or Environmental Sustainability. 3 Credits.

Students will investigate and design solutions in response to real-world challenges related to clean and abundant drinking water, food supply issues, and renewable energy. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 125. Computer Integrated Manufacturing. 3 Credits.

This course teaches the fundamentals of computerized manufacturing technology. It builds on the solid modeling skills developed in Introduction to Engineering. Students will be able to describe and design a manufacturing process. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 126. Aerospace Engineering. 3 Credits.

The major focus of this course is to expose students to the world of aeronautics, flight, and engineering through the fields of aerospace engineering and related areas of study. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

ENGR 127. Engineering Design and Development. 3 Credits.

Engineering Design and Development is the capstone course in the Project Lead the Way high school engineering program. It is an engineering research course in which students work in teams to design and develop an original solution to a valid open ended problem. Prereq: ENGR 120 and ENGR 121.

ENGR 128. Computer Science and Software Engineering. 3 Credits.

This course covers the computer science principles framework. This course teaches multiple programming languages and aims to develop computational thinking. This will help generate excitement in the field of computer and software engineering. This course is part of the Project Lead The Way program. Prereq: ENGR 120.

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. Study Abroad. 1-15 Credits.****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 379. Study Tour Abroad. 1-6 Credits.

ENGR 391. Seminar. 1-3 Credits.

ENGR 392. Study Abroad. 1-15 Credits.

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. F, S.

ENGR 489. Collaborative Engineering Capstone. 3 Credits.

Integration of engineering and architecture topics and job functions projects. Students will plan, design, develop, verify, produce/construct/service facilities and systems created to fulfill industrial, agricultural, urban, and business needs. Prereq: Senior standing and major departmental approval. F, S.

ENGR 491. Seminar. 1-5 Credits.

ENGR 492. Study Abroad. 1-15 Credits.

ENGR 493. Undergraduate Research. 1-5 Credits.

ENGR 494. Individual Study. 1-5 Credits.

ENGR 496. Field Experience. 1-15 Credits.

ENGR 499. Special Topics. 1-5 Credits.

ENGR 696. Special Topics. 1-5 Credits.

ENGR 715. Engineering Systems. 3 Credits.

Interdisciplinary systems analysis approach to engineering problems. Mathematical and physical stochastic process and control systems.

ENGR 741. Systems-Linear and Nonlinear Concepts. 3 Credits.

Nonlinear and linear programming methods for engineering design optimization. Formulation and optimization of design problems from all areas of engineering.

ENGR 762. Heat and Mass Transfer. 3 Credits.

Theory and application of transport of heat and mass. Heat diffusion equation in several coordinate systems. Fourier series and transforms and Laplace transform techniques. Mass transfer examples. Introduction to simulations.

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 780. Electromagnetic Theory. 3 Credits.

Physical concepts and mathematical solutions of Maxwell equations; boundary conditions, force, and energy equations; potential equations; Green's functions; wave equations, radiation, and propagation of electromagnetic waves. F/2.

ENGR 789. Advanced Research Methods in Engineering. 3 Credits.

Advanced study of the philosophy, reasoning, design, methods, and procedures employed in conducting and disseminating scientific research. Includes a survey of current and original research with interpretation and assessment.

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 100. Writing Lab. 1 Credit.

This course will provide additional support for and extension of ENGL 110, including one-to-one conferences, peer group sessions, and relevant online learning. Co-req: ENGL 110 or ENGL 112. Does not satisfy any requirements for graduation.

ENGL 110. College Composition I. 3 Credits.

Guided practice in college-level reading, writing, and critical thinking. Includes process writing and an introduction to library research. Co-req: ENGL 100.

ENGL 112. ESL College Composition I. 3 Credits.

Guided practice in college-level reading, writing, and critical thinking, with attention to issues encountered by non-native English speakers. Includes writing process, genres, and an introduction to research. Equivalent to ENGL 110. Co-req: ENGL 100.

ENGL 120. College Composition II. 3 Credits.

Advanced practice in college-level writing from sources and in applying rhetorical strategies. Requires library research and use of summaries, paraphrases, and quotations from relevant sources in analysis and persuasion essays. 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. ESL College Composition II. 4 Credits.

Guided advanced practice in college level writing from sources and in rhetorical strategies, with additional support related to higher level language acquisition and usage for non-native speakers of English. Equivalent to ENGL 120. Prereq: ENGL 112.

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. Prereq: ENGL 120.

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 231. 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 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 271. Literary Analysis. 3 Credits.

Introduction to traditional and contemporary approaches in the study of literature and the fundamental skills required for the analysis of literary 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. Study Abroad. 1-15 Credits.

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 315. 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 316. 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 317. 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 318. 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 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 genre: Fiction in the fall semester and Poetry in the spring semester. May be repeated for credit with change in genre. Prereq: ENGL 120, ENGL 229 and Junior standing.

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. At least 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. British and American Women Writers. 3 Credits.

Investigation of the literary portrayal of women and its effects on society. Some consideration of problems specific to women writers. Prereq: ENGL 120.

ENGL 331. Contemporary Women Writers. 3 Credits.

Study of the language, imagery, themes, and genres in 20th century literature by women of various cultural, ethnic, and national backgrounds. 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. 20th Century American Fiction. 3 Credits.

Selected fiction reflecting social, psychological, and literary trends in the 20th century. Includes 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 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. Study Tour Abroad. 1-6 Credits.**ENGL 380. Shakespeare. 3 Credits.**

Study of representative poetry, comedies, histories, and tragedies. Prereq: ENGL 120.

ENGL 381. American Road Book. 3 Credits.

A study of the American road narrative in cultural and historical contexts, including the rise of the automobile and tourism; the American dream; the frontier myth; race, class and gender; and national and individual identity. 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 271.

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. Study Abroad. 1-15 Credits.****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 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 271 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 271.

ENGL 471. American Realistic Literature. 3 Credits.

Principles of American literary realism as exhibited in the major works of Howells, James, Twain, Crane, Chopin, Gilman, Norris, Wharton, Dreiser, and others. Combination varies. Prereq: ENGL 271. {Also offered for graduate credit - see ENGL 671.}.

ENGL 472. 20th Century American Writers. 3 Credits.

Intensive study of major American writers from 1900 to 1950. Prereq: ENGL 271. {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 271. {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 271. {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 271. {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 271. {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 271. {Also offered for graduate credit - see ENGL 683.}.

ENGL 485. 18th Century Literature. 3 Credits.

Study of major writers: Dryden, Pope, Swift, and Johnson, with occasional excursions into the fictional territory of Richardson, Fielding, Sterne, and Smollett. Prereq: ENGL 271. {Also offered for graduate credit - see ENGL 685.}.

ENGL 486. Romantic Literature. 3 Credits.

Study of major British writers from the French Revolution to the coronation of Queen Victoria. Prereq: ENGL 271. {Also offered for graduate credit - see ENGL 686.}.

ENGL 491. Seminar. 1-5 Credits.**ENGL 492. Study Abroad. 1-15 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 651. Advanced English Grammar. 3 Credits.

Systematic examination of the structures and processes that shape English sentences; development of skills to analyze why certain structures are more or less appropriate. Prereq: ENGL 650.

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 671. American Realistic Literature. 3 Credits.

Principles of American literary realism as exhibited in the major works of Howells, James, Twain, Crane, Chopin, Gilman, Norris, Wharton, Dreiser, and others. Combination varies. {Also offered for undergraduate credit - see ENGL 471.}

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 685. 18th Century Literature. 3 Credits.

Study of major writers: Dryden, Pope, Swift, and Johnson, with occasional excursions into the fictional territory of Richardson, Fielding, Sterne, and Smollett. {Also offered for undergraduate credit - see ENGL 485.}

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. Study Abroad. 1-15 Credits.****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 782. Studies in Irish Literature. 3 Credits.

Intensive study of a special theme, form, period, group of writers, or individual writer (Joyce, Yeats) in Irish literature. May be repeated for credit with change of topic.

ENGL 790. Graduate Seminar. 1-3 Credits.

ENGL 791. Temporary/Trial Topics. 1-5 Credits.

ENGL 793. Indiv 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 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. F.

ENT 291. Seminar. 1-3 Credits.

ENT 292. Study Abroad. 1-15 Credits.

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 360. Economic Entomology. 1-3 Credits.

A distance education course covering agronomic and horticulture insect pests including impact of insects, introduction to IPM, pest management tools, and insect vectors of diseases. May be repeated for 1 credit if previously taken for 2 credits. Prereq: BIOL 151.

ENT 379. Study Tour Abroad. 1-6 Credits.

ENT 391. Seminar. 1-3 Credits.

ENT 392. Study Abroad. 1-15 Credits.

ENT 394. Individual Study. 1-5 Credits.

ENT 399. Special Topics. 1-5 Credits.

ENT 410. Intergrated Management of Pests. 3 Credits.

How pests are managed and influenced by the environment, society, economics, and pest biology. This class will look at these factors and how they affect pest management practice across taxonomic groups. Prereq: BIOL 151, ENT 350, PPTH 324, PLSC 323. {Also offered for graduate credit - see ENT 610.}.

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 (even years) {Also offered for graduate credit - see ENT 631.}.

ENT 470. Insect Ecology. 3 Credits.

This course is an introduction to the fundamental concepts of ecology as they relate to insects. We will emphasize how ecological principles help inform many areas of applied and basic entomological research. Prereq: ENT 350. S (odd years) {Also offered for graduate credit - see ENT 670.}.

ENT 491. Seminar. 1-5 Credits.

ENT 492. Study Abroad. 1-15 Credits.

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 610. Integrated Management of Pests. 3 Credits.

How pests are managed and influenced by the environment, society, economics, and pest biology. This class will look at these factors and how they affect pest management practice across taxonomic groups. {Also offered for undergraduate credit - see ENT 410.}

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 (even years) {Also offered for undergraduate credit - see ENT 431.}.

ENT 670. Insect Ecology. 3 Credits.

This course is an introduction to the fundamental concepts of ecology as they relate to insects. We will emphasize how ecological principles help inform many areas of applied and basic entomological research. S (odd years) {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 765. Biological Control of Insects and Weeds. 3 Credits.

The natural or applied regulation of pests by predaceous and parasitic insects and pathogens.

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 793. Indiv 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 842. Quantitative Biology. 3 Credits.

Philosophy and techniques for collecting, handling, and interpreting research data in the biological sciences. S Cross-listed with BIOL 842.

ENT 899. Doctoral Dissertation. 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 130. Drawing for Environmental Designers. 3 Credits.

Introduction to traditional freehand methods of graphic exploration as employed in architecture and landscape architecture.

ENVD 172. Environmental Design Fundamentals. 4 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.

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: ACCT 200, ACCT 201, ECON 201, ECON 202, STAT 330. 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, Jr or Sr classification, 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 320 and any FIN 400 level course satisfying finance concentration. 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 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see FIN 640.}.

FIN 450. Money and Capital Markets. 3 Credits.

Examination of saving-investment decisions, flow of funds, interest rate theories, risk structure, and function of financial markets. Security pricing and portfolio strategies in money, bond, tax exempt, and foreign exchange markets. Prereq: FIN 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 FIN 650.}.

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, Jr or Sr classification, 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 a junior or a senior 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 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. {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. Money and Capital Markets. 3 Credits.

Examination of saving-investment decisions, flow of funds, interest rate theories, risk structure, and function of financial markets. Security pricing and portfolio strategies in money, bond, tax exempt, and foreign exchange markets. {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 740. Advanced Financial Management. 3 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.

Food Safety (SAFE)

SAFE 401. Food Safety Information & Flow of Food. 1 Credit.

An orientation to food safety. How to find, evaluate and report credible food safety information, and comprehension of the complexity of food systems. {Also offered for graduate credit - see SAFE 601.}.

SAFE 402. Foodborne Hazards. 1 Credit.

This course will lead students into the comprehension of the vast variety of chemical, physical and biological foodborne hazards. Prereq: SAFE 401 or SAFE 601. {Also offered for graduate credit - see SAFE 602.}.

SAFE 403. Food Safety Risk Assessment. 1 Credit.

This course will enforce the concept that no food is 100% safe, and will lead students to understand how to assess the likelihood of foodborne illness events. Prereq: SAFE 402 or SAFE 602. {Also offered for graduate credit - see SAFE 603.}.

SAFE 404. Epidemiology of Foodborne Illness. 1 Credit.

This course will lead students to understand foodborne disease outbreaks, comprehend and apply epidemiologic models of disease causation and causal inference, and apply disease outbreak investigation steps. Prereq: SAFE 403 or SAFE 603. {Also offered for graduate credit - see SAFE 604.}.

SAFE 405. Costs of Food Safety. 1 Credit.

This course will lead students to comprehend and analyze the economic and societal costs of foodborne illness outbreaks. Prereq: SAFE 404 or SAFE 604. {Also offered for graduate credit - see SAFE 605.}.

SAFE 406. Food Safety Crisis Communication. 1 Credit.

This course will lead students to understand the best ways to disseminate food safety information during or following a foodborne illness outbreak. Prereq: SAFE 405 or SAFE 605. {Also offered for graduate credit - see SAFE 606.}.

SAFE 407. Food Safety Risk Management. 1 Credit.

This course will lead students to understand strategies and costs of reducing risk of foodborne illness. Prereq: SAFE 406 or SAFE 606. {Also offered for graduate credit - see SAFE 607.}.

SAFE 408. Food Safety Regulatory Issues. 1 Credit.

This course will lead students to understand the food safety regulatory structure. Prereq: SAFE 407 or SAFE 607. {Also offered for graduate credit - see SAFE 608.}.

SAFE 409. Food Safety Risk Communication & Education. 1 Credit.

This course will lead students to understand the importance of worker training and consumer education in food safety. Prereq: SAFE 408 or SAFE 608. {Also offered for graduate credit - see SAFE 609.}.

SAFE 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 SAFE 640.}.

SAFE 452. Food Laws and Regulations. 3 Credits.

Regulations, laws, and dynamics governing development of food policy. Prereq: SAFE 470. Cross-listed with CFS 452 and AGECE 452. {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 601. Food Safety Information & Flow of Food. 1 Credit.**

An orientation to food safety. How to find, evaluate and report credible food safety information, and comprehension of the complexity of food systems. {Also offered for undergraduate credit - see SAFE 401.}.

SAFE 602. Foodborne Hazards. 1 Credit.

This course will lead students into the comprehension of the vast variety of chemical, physical and biological foodborne hazards. Prereq: SAFE 601. {Also offered for undergraduate credit - see SAFE 402.}.

SAFE 603. Food Safety Risk Assessment. 1 Credit.

This course will enforce the concept that no food is 100% safe, and will lead students to understand how to assess the likelihood of foodborne illness events. Prereq: SAFE 602. {Also offered for undergraduate credit - see SAFE 403.}.

SAFE 604. Epidemiology of Foodborne Illness. 1 Credit.

This course will lead students to understand foodborne disease outbreaks, comprehend and apply epidemiologic models of disease causation and causal inference, and apply disease outbreak investigation steps. Prereq: SAFE 603. {Also offered for undergraduate credit - see SAFE 404.}.

SAFE 605. Costs of Food Safety. 1 Credit.

This course will lead students to comprehend and analyze the economic and societal costs of foodborne illness outbreaks. Prereq: SAFE 604. {Also offered for undergraduate credit - see SAFE 405.}.

SAFE 606. Food Safety Crisis Communication. 1 Credit.

This course will lead students to understand the best ways to disseminate food safety information during or following a foodborne illness outbreak. Prereq: SAFE 605. {Also offered for undergraduate credit - see SAFE 406.}.

SAFE 607. Food Safety Risk Management. 1 Credit.

This course will lead students to understand strategies and costs of reducing risk of foodborne illness. Prereq: SAFE 606. {Also offered for undergraduate credit - see SAFE 407.}.

SAFE 608. Food Safety Regulatory Issues. 1 Credit.

This course will lead students to understand the food safety regulatory structure. Prereq: SAFE 607. {Also offered for undergraduate credit - see SAFE 408.}.

SAFE 609. Food Safety Risk Communication & Education. 1 Credit.

This course will lead students to understand the importance of worker training and consumer education in food safety. Prereq: SAFE 608. {Also offered for undergraduate credit - see SAFE 409.}.

SAFE 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 SAFE 440.}.

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. Cross-listed with COMM 785.

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 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 291. Seminar. 1-3 Credits.**FREN 292. Study Abroad. 1-15 Credits.****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 English and French.

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. Study Tour Abroad. 1-6 Credits.**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. Study Abroad. 1-15 Credits.****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. Study Abroad. 1-15 Credits.

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. Study Abroad. 1-15 Credits.

GEOG 294. Individual Study. 1-5 Credits.

GEOG 299. Special Topics. 1-5 Credits.

GEOG 379. Study Tour Abroad. 1-6 Credits.

GEOG 391. Seminar. 1-3 Credits.

GEOG 392. Study Abroad. 1-15 Credits.

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, hydrological 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 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. Study Abroad. 1-15 Credits.****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, hydrologi analyses, risk assessment, policy making, disaster response and strategis 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 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 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 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 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 106. The Earth Through Time. 3 Credits.

Introduction to the Earth through time; its origin, history, and evolution of animal and plant life.

GEOL 107L. Eastern North Dakota Field Course. 1 Credit.

Field study of Mesozoic and Cenozoic sediments, landforms, and geological processes that have shaped the landscape of eastern North Dakota. Two-day field excursion and a report. Fee required. Recommended: GEOL 105 or GEOL 106.

GEOL 194. Individual Study. 1-5 Credits.**GEOL 196. Field Experience. 1-15 Credits.****GEOL 199. Special Topics. 1-5 Credits.****GEOL 210. Dinosaurs: Rulers of the Mesozoic. 2 Credits.**

A survey of the dinosaurs: their fossil record, environment and place in Earth history.

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. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.**GEOL 391. Seminar. 1-3 Credits.****GEOL 392. Study Abroad. 1-15 Credits.****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 440. Quaternary Biology. 4 Credits.

Biotic responses to climatic changes; the role of adaptation, extinction, and dispersal in response to the climatic changes of the Quaternary. 2 lectures, field and laboratory studies. Offered periodically. Recommended: GEOL 106, GEOL 106L. {Also offered for graduate credit - see GEOL 640.}.

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 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. Study Abroad. 1-15 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 640. Quaternary Biology. 4 Credits.

Biotic responses to climatic changes; the role of adaptation, extinction, and dispersal in response to the climatic changes of the Quaternary. 2 lectures, field and laboratory studies. Offered periodically. {Also offered for undergraduate credit - see GEOL 440 .}.

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 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 GEOL 470.}.

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 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. Study Abroad. 1-15 Credits.

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.

GERM 379. Study Tour Abroad. 1-6 Credits.

GERM 391. Seminar. 1-3 Credits.

GERM 392. Study Abroad. 1-15 Credits.

GERM 394. Individual Study. 1-5 Credits.

GERM 399. Special Topics. 1-5 Credits.

GERM 491. Seminar. 1-5 Credits.

GERM 492. Study Abroad. 1-15 Credits.

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 108. Tae Kwon Do I. 1 Credit.

The purpose of this course is to teach basic technique and practice of Tae Kwon Do.

HNES 109. Beginning Aikido. 1 Credit.

The purpose of this course is to teach basic technique and practice of beginning Aikido.

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 118. Tae Kwon Do II. 1 Credit.

Continuation of Tae Kwon Do I. Teaching the basic technique and practice of Tae Kwon Do.

HNES 119. Beginning PADI Open Water Scuba. 2 Credits.

Beginning level scuba skills.

HNES 121. Intermediate Aikido. 1 Credit.

The purpose of this course is to teach intermediate techniques and practice of Aikido.

HNES 122. Advanced PADI Open Water Scuba. 2 Credits.

Advanced level scuba skills. Prereq: HNES 119.

HNES 123. Yoga. 1 Credit.

Basic technique and practice of yoga.

HNES 124. Tai Chi. 1 Credit.

Basic technique and practice of tai chi.

HNES 125. Tai Chi II. 1 Credit.

The purpose of this course is to teach intermediate techniques and practice of Tai Chi.

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 127. Self Defense. 1 Credit.

Basic technique and practice of self defense.

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 131. Pilates. 1 Credit.

Basic technique and practice of Pilates.

HNES 134. Basketball. 1 Credit.

Basic technique and practice of basketball.

HNES 135. Badminton. 1 Credit.

Basic technique and practice of badminton.

HNES 136. Beginners Open Water Scuba Diving - SSI. 2 Credits.

Beginning level scuba skills for Scuba Schools International (SSI).

HNES 139. Dodgeball. 1 Credit.

Basic technique and practice of dodgeball.

HNES 141. Food Sanitation. 1 Credit.

Principles of safe food handling practices designed for foodservice operators. Includes Food Safety Managers' Certification. Restricted to Dietetics, Hospitality, Family Consumer Science, Food Science, and Food Safety majors and minors only.

HNES 142. Yoga II. 1 Credit.

This intermediate yoga educational course is based upon asanas (postures), pranayama (breathing techniques), and shamata practice (mindfulness). Emphasis is placed on combining awareness, stability and fluidity in the creation of a personal practice.

HNES 150. Foundations of Physical Education. 2 Credits.

Introduction to developing a conceptual framework for teaching physical education. Includes an overview of the preparation needed and what is expected of physical education teachers.

HNES 154. 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 150.

HNES 160. Foundations of Health Professions. 2 Credits.

Introduction to health education and health promotion that examines the professional activities and competencies required for successful practice in the field.

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 200. Principles of Nutrition. 3 Credits.**

Current nutrition facts and philosophy as a basis for meeting nutritional needs in a changing society. 3 lectures.

HNES 210. Professional Rescuer CPR/AED and First Aid. 1 Credit.

This course will provide the student with the knowledge and skills necessary in an emergency to help sustain life and minimize pain and the consequences of injury or sudden illness until medical help arrives. Successful completion leads to American Red Cross CPR/AED for the Professional Rescuer and Health Care Providers and First Aid certifications. Restricted to Exercise Science, Physical Education, Health Education, Sport Management, Radiologic Sciences and Respiratory Care majors only.

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 224. Sport and Event Management. 3 Credits.

Introductory course in sport and event management that will provide students the opportunity to investigate the facilitation of sports events. A major component of this course will be working in a management or leadership role within a major sports event. Prereq: HNES 110 and Sports & Recreation Leadership majors only.

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 110 and Sports & Recreation Leadership 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. Prereq or Coreq: CHEM 117 or CHEM 121.

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 255, HNES 256, HNES 301 and HPE professional standing.

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: HNES 150, HNES 154, HNES 253, HNES 256 and HPF professional standing. Co-req: HNES 110.

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.

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. Prereq: HNES 141. Coreq: HNES 261.

HNES 271. Techniques of Strength and Conditioning. 3 Credits.

The course presents strength training and conditioning theory and practice. Explored are principles of strength and conditioning, mastery and analyses of different exercises, and program design and implementation for general/athletic/special populations. Prereq: Exercise Science majors only.

HNES 272. Techniques of Cardiovascular Conditioning. 3 Credits.

Understanding the techniques of conditioning the cardiovascular system. Types of conditioning explored: walking, jogging, spinning, aerobic dance, step aerobics, bench programming, cardio-kickboxing, TaeBo, and other popular types of programming. Formerly HNES 270.

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. Study Abroad. 1-15 Credits.****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: HNES 110, HNES 154, HNES 254, HNES 255, HNES 256 and professional level 2 students only.

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 110, HNES 224, HNES 226 and students must be admitted to the Sport and Recreation Leadership professional program.

HNES 305. Legal Liability and Ethics in Sport. 3 Credits.

Focus on risk management and legal liability in sport management. Overview of civil and criminal law related to sport. Prereq: HNES 110, HNES 224, HNES 226 and students must be admitted to the Sport and Recreation Leadership professional program.

HNES 326. Recreation Programming. 3 Credits.

Principles of the process for designing leisure experiences. Art, crafts, music, dance, sport and games, special events, and environmental activities are examined. Risk management, intramural sports organization and program budgeting are stressed. Prereq: Sports & Recreation Leadership majors only.

HNES 330. Coaching Football. 2 Credits.

Rules, theory, principles, and fundamentals of coaching football. Prereq: Knowledge of the sport.

HNES 331. Coaching Basketball. 2 Credits.

Rules, theory, principles, and fundamentals of coaching basketball. Prereq: Knowledge of the sport.

HNES 332. Coaching Track & Field. 2 Credits.

Rules, theory, principles, and fundamentals of coaching track and field. Prereq: Knowledge of the sport.

HNES 333. Coaching Wrestling. 2 Credits.

Rules, theory, principles, and fundamentals of coaching wrestling. Prereq: Knowledge of the sport.

HNES 334. Coaching Baseball/Softball. 2 Credits.

Rules, theory, principles, and fundamentals of coaching baseball and softball. Prereq: Knowledge of the sport.

HNES 335. Coaching Volleyball. 2 Credits.

Rules, theory, principles, and fundamentals of coaching volleyball. Prereq: Knowledge of the sport.

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: professional level 2 PE major or coaching minor.

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 367 and Health Education majors only.

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, CHEM 240, BIOC 260 or BIOC 460 and Dietetics professional standing.

HNES 352. Physical Education Activities and Materials. 3 Credits.

Study of physical education activities and materials that physical education majors and minors will use in EDUC 481. Prereq: HNES 253, HNES 255, HNES 256, HNES 300, HNES 367 and HPE 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 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 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 355. International Health. 3 Credits.

Introduction to the interrelationship of health and international affairs focusing on health as an issue of international relations and the technical and financial cooperation for health and the development.

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: HNES 254.

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. Study Tour Abroad. 1-6 Credits.

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. Study Abroad. 1-15 Credits.

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 PNAS.

HNES 420. Needs Assessment and Program Planning in Health Education. 3 Credits.

This course provides students with the practical knowledge and skills to assess health resources and needs, and to develop and implement health promotion programs to meet specific needs in particular populations.

HNES 426. Sport Administration. 3 Credits.

This course is intended to familiarize sport management majors with common administrative practices in sport. Prereq: HNES 110, HNES 224, HNES 226, HNES 304, HNES 305, HNES 431, HNES 436, junior standing and Sport Management majors only .

HNES 427. Leisure And Society. 3 Credits.

Survey of leisure problems and opportunities in society. Emphasis on critical analysis of completed writing and research in sport and recreation. Historical foundations and development of a personal philosophy of sport and recreation are stressed. Prereq: Junior standing.

HNES 431. Governance and Policy 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 305 and Sports & Recreation Leadership majors only.

HNES 436. Contemporary Issues in Sport Management. 3 Credits.

Students will gain a level of understanding of issues and current events in sport management. Prereq: HNES 110, HNES 224, HNES 226 and students must be admitted to the Sports and Recreation Leadership professional program as prerequisites and HNES 304 as a co-requisite.

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 442L. Community Health and Nutrition Laboratory. 2 Credits.

Application of nutrition education and program development in community settings. Coreq: HNES 442. {Also offered for graduate credit - see HNES 642L.}.

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.

HNES 452. 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. Prereq: HNES 200 or HNES 250. {Also offered for graduate credit - see HNES 652.}.

HNES 455. 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. Prereq: HNES 200 or equivalent and at least sophomore standing. {Also offered for graduate credit - see HNES 655.}.

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. Foodservice Systems Management II. 3 Credits.

Role of foodservice in today's society. Application of administration concepts in foodservice operation including equipment, layout, marketing, and budget management. 3 lectures. Prereq: HNES 361, HNES 361L. {Also offered for graduate credit - see HNES 660.}.

HNES 460L. Foodservice Systems Management II Laboratory. 3 Credits.

Supervised practice for CP students in foodservice to accompany HNES 460. 1 eight-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: EDUC 451 (PE) and professional level 2 PE standing.

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 482. Community Health Internship. 12 Credits.

Capstone course for Health Education Majors' Community Health Option. Supervised field work in an approved professional setting with an emphasis on administration, supervision and program implementation leadership. Prereq: Senior standing and admission to the professional program.

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 110, HNES 224, HNES 226 and students must be admitted to the Sport Management professional program.

HNES 491. Seminar. 1-5 Credits.**HNES 492. Study Abroad. 1-15 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. 2 Credits.

Application of nutrition education and program development in community settings. Coreq: HNES 642. {Also offered for undergraduate credit - see HNES 442L.}.

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. {Also offered for undergraduate credit - see HNES 452.}.

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. 4 Credits.

Principles in the nutrition care of patients with conditions requiring nutrition care. 4 lectures. {Also offered for undergraduate credit - see HNES 458.}.

HNES 660. Foodservice Systems Management II. 3 Credits.

Role of foodservice in today's society. Application of administration concepts in foodservice operation including equipment, layout, marketing, and budget management. {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 Entrepreneurship. 3 Credits.

This course provides an introduction to leadership and entrepreneurship in physical education and sport settings. The course is designed to provide students with skills, techniques and practices for successful leadership and entrepreneurship.

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 706. Injury Prevention, Care and Management. 3 Credits.

This course is designed to help students understand the guidelines and recommendations for preventing injuries, recognizing injuries, and how to best manage an injury situation.

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 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. Supervision and Management. 3 Credits.

This course is designed to study the scope of supervision and management for the improvement of various phases of the learning process of teaching and coaching. Students will learn to use various models of supervision and study many aspects of management.

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 721. Health Promotion Programming. 3 Credits.

This course is designed to help students understand and develop skills for health promotion programming, regardless of settings.

HNES 722. Readings in Sports Medicine. 3 Credits.

This course will critically appraise sports medicine research.

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 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 environmental (PSE) changes by examining laws, system changes, changes to economic, social, or physical environments.

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 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 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.

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 750. Advanced Human Nutrition. 3 Credits.

Physiological and biochemical aspects of human nutrition. Prereq: BIOC 701.

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 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 755. Advanced Clinical Nutrition. 3 Credits.

In-depth study of the pathophysiology of nutritional disease. The emphasis is in endocrinology, metabolism, and gastroenterology. Includes pathological disorders which result in nutritional disease or those nutrition diseases which affect physiological function.

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 and Nutrition Science. 3 Credits.

Instruction and practical guidelines of different physiological and fitness assessments in exercise and nutrition sciences.

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 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. 3 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. 5 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 783. Athletic Training Clinical Education I. 2 Credits.

Clinical experiences and mastery of assigned proficiencies. Didactic learning will include environmental conditions/illnesses and protective devices. Prereq: HNES 780.

HNES 784. Athletic Training Clinical Education II. 2 Credits.

Clinical experiences and mastery of assigned proficiencies. Didactic learning will include general nutrition concepts and prevention and health promotion concepts. Prereq: HNES 783.

HNES 785. Athletic Training Clinical Education III. 2 Credits.

Clinical experiences and mastery of assigned proficiencies. Didactic learning will include mental health conditions and therapeutic medications. Prereq: HNES 784.

HNES 786. Diagnostic Evaluation of Athletic Injuries. 3 Credits.

This course will focus on new exam techniques to advance the practice of athletic training skills in assessment and diagnosis.

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 789. Athletic Training Clinical Education IV. 3 Credits.

Clinical experiences and comprehensive mastery of assigned proficiencies. Didactic learning will include psychosocial strategies and referral, and cultural competence. Prereq: HNES 785.

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 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.

Survey of United States history to 1877, emphasizing major political, economic, social, and cultural developments.

HIST 104. U.S. Since 1877. 3 Credits.

Survey of United States history since 1877, emphasizing major political, economic, social, and cultural developments.

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 254. 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 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 260. Women In America. 3 Credits.

A survey of the 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. CCN.

HIST 261. American Indian History. 3 Credits.

Survey of Native American history, emphasizing diversity of historical experience. Themes include cultural persistence, leadership and activism, and strategies adopted by Indian communities for coping with change.

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. Study Abroad. 1-15 Credits.****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 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 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.

HIST 379. Study Tour Abroad. 1-6 Credits.**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 382. Canada. 3 Credits.

Topical treatment of the history of Canada, beginning with First Nations and charting the evolution of a bi-cultural, multi-cultural nation-state.

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. Study Abroad. 1-3 Credits.****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 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. U.S. History 1763-1829. 3 Credits.

Revolutionary and early national periods of American history. {Also offered for graduate credit - see HIST 621.}.

HIST 422. U.S. History 1829-1917 I. 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. U.S. History 1829-1917 II. 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-Present I. 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 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 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 437. American West Since 1850. 3 Credits.

Centers on a century of enormous change in the trans-Mississippi west. Major topics include the Plains Indian wars, post-conquest Indian history, mining, cattle, homesteading frontiers, the urban West, and environmental history. {Also offered for graduate credit - see HIST 637.}.

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 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 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 455. The Eighteenth Century. 3 Credits.

Political, social, and economic history of continental Europe from 1650 to 1815; with a focus on Enlightenment and French Revolution. {Also offered for graduate credit - see HIST 655.}.

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 470. Modern Latin America I. 3 Credits.

Examines the social, economic, political, and cultural developments in Latin American history. Begins with the wars of independence (circa 1800) and concludes with the emergence of modern states at the close of the 19th century. {Also offered for graduate credit - see HIST 670.}.

HIST 471. Modern Latin America II. 3 Credits.

Study of important social, economic, political, and cultural developments in Latin America from the late 19th century through the modern epoch. {Also offered for graduate credit - see HIST 671.}.

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 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 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. Study Abroad. 1-15 Credits.****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}.

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American history from the Pre-Columbian period through 1763. {Also offered for undergraduate credit - see HIST 420.}.

HIST 621. U.S. History 1763-1829. 3 Credits.

Revolutionary and early national periods of American history. {Also offered for undergraduate credit - see HIST 421.}.

HIST 622. U.S. History 1829-1917 I. 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. U.S. History 1829-1917 II. 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-Present I. 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 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.}.

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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.}.

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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 637. American West Since 1850. 3 Credits.

Centers on a century of enormous change in the trans-Mississippi west. Major topics include the Plains Indian wars, post-conquest Indian history, mining, cattle, homesteading frontiers, the urban West, and environmental history. {Also offered for undergraduate credit - see HIST 437.}.

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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 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 655. The Eighteenth Century. 3 Credits.

Political, social, and economic history of continental Europe from 1650 to 1815; with a focus on Enlightenment and French Revolution. {Also offered for undergraduate credit - see HIST 455.}.

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 670. Modern Latin America I. 3 Credits.

Examines the social, economic, political, and cultural developments in Latin American history. Begins with the wars of independence (circa 1800) and concludes with the emergence of modern states at the close of the 19th century. {Also offered for undergraduate credit - see HIST 470.}.

HIST 671. Modern Latin America II. 3 Credits.

Study of important social, economic, political, and cultural developments in Latin America from the late 19th century through the modern epoch. {Also offered for undergraduate credit - see HIST 471.}.

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 690. Graduate Seminar. 1-3 Credits.**HIST 695. Field Experience. 1-15 Credits.****HIST 696. Special Topics. 1-5 Credits.****HIST 701. Methods of Historical Research. 3 Credits.**

Techniques and frameworks of historical research, introduction to types of evidence, and evaluation of sources. Taken during the student's first semester in the program.

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 706. Seminar in the Teaching Of History. 1-4 Credits.

Includes methods appropriate to college-level teaching. Class consists of discussion, demonstration, and practice. S/U grading only.

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 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 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, 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. Study Abroad. 1-15 Credits.****H&CE 294. Individual Study. 1-5 Credits.****H&CE 299. Special Topics. 1-5 Credits.****H&CE 379. Study Tour Abroad. 1-6 Credits.****H&CE 391. Seminar. 1-3 Credits.****H&CE 392. Study Abroad. 1-15 Credits.****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.

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. 2 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. {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.

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, EDUC486, 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 487P. Student Teaching. 12 Credits.

Supervised teaching in an approved and accredited school. Includes an on-campus seminar.

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. Study Abroad. 1-15 Credits.****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 646. Extension Education. 2 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. {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 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. SAE/Adult Programs. 3 Credits.

Principles of leadership, design, analysis, record keeping, student organizations, and activities in adult/youth programs. Community-based programs in adult farm business management education. Prereq: Teaching experience.

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 & Education, General (HD&E)

HD&E 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. Repeated course opportunity exists for failing grades only. Cross-listed with ABEN 189, AGRI 189, BUSN 189, ME 189 and UNIV 189. F, S.

HD&E 194. Individual Study. 1-3 Credits.

HD&E 196. Field Experience. 1-15 Credits.

HD&E 199. Special Topics. 1-5 Credits.

HD&E 291. Seminar. 1-3 Credits.

HD&E 292. Study Abroad. 1-15 Credits.

HD&E 294. Individual Study. 1-5 Credits.

HD&E 299. Special Topics. 1-5 Credits.

HD&E 320. Professional Issues. 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.

HD&E 379. Study Tour Abroad. 1-6 Credits.

HD&E 391. Seminar. 1-5 Credits.

HD&E 392. Study Abroad. 1-15 Credits.

HD&E 394. Individual Study. 1-5 Credits.

HD&E 396. Field Experience. 1-15 Credits.

HD&E 399. Special Topics. 1-5 Credits.

HD&E 491. Seminar. 1-5 Credits.

HD&E 492. Study Abroad. 1-15 Credits.

HD&E 494. Individual Study. 1-5 Credits.

HD&E 496. Field Experience. 1-15 Credits.

HD&E 499. Special Topics. 1-5 Credits.

HD&E 690. Graduate Seminar. 1-5 Credits.

HD&E 696. Special Topics. 1-5 Credits.

HD&E 777. Advanced Stress Management. 3 Credits.

The dynamics of stress, sources and symptoms of stress, and stress management techniques will be presented. Research in stress from the interdisciplinary perspectives of wellness, applied gerontology, and counseling.

HD&E 790. Graduate Seminar. 1-5 Credits.

HD&E 793. Individual Study. 1-5 Credits.

HD&E 794. Practicum/Internship. 1-8 Credits.

Human Development & Family Science (HDFS)

HDFS 110. Introduction to Human Development and Family Science. 1 Credit.

Introduction to the Human Development and Family Science department and field. Prereq: restricted to HDFS majors only.

HDFS 135. Family Science. 3 Credits.

Introduction to family science concepts including family life cycle, different styles of family life, and the influence of society on the family.

HDFS 182. Wellness and Aging. 3 Credits.

Study of wellness in the later years with a focus on the positive aspects of aging and the contributions of elders in society including emphases on research, theory, and wellness resources.

HDFS 185. Financial Survival for College Students. 2 Credits.

This course provides a foundation for personal financial planning focusing on the skills and tools needed to organize and manage personal finances in the real world.

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 291. Seminar. 1-5 Credits.**HDFS 310. Citizenship & Social Activism. 3 Credits.**

This course is designed to help students understand and promote civic engagement and leadership. Students will learn to analyze social, economic, and political problems through a theoretical framework and practical application. Leadership development will be emphasized using tools of social change.

HDFS 320. Prenatal, Infant and Toddler Development. 3 Credits.

Study of growth and development of the child from conception to age 3.

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 320, or PSYC 250.

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 or HDFS 320 or HDFS 330 or PSYC 250.

HDFS 341. Parent-Child Relations. 3 Credits.

Contemporary parenting principles and strategies. Emphasis on application in the home and professional settings. Prereq: HDFS 135 and HDFS 230 or HDFS 320 or HDFS 330 or HDFS 450 or PSYC 250.

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. Recommended Prereq: HDFS 320 or HDFS 330. This course is restricted to HDFS majors and minors or WGS majors or minors.

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 135 and junior or senior standing.

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. Recommended: HDFS 186. This course is restricted to HDFS majors and minors or FACS Ed majors or pre-FACS majors or WGS majors or minors.

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: junior or senior 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. {Also offered for graduate credit - see HDFS 624.}

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: HDFS 250 and junior or senior standing. {Also offered for graduate credit - see HDFS 630.}

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: HDFS 250 and junior or senior standing. {Also offered for graduate credit - see HDFS 635.}

HDFS 445. Topics in Family Science. 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: HDFS 135, HDFS 242, HDFS 250 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: 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: HDFS 135, HDFS 242, junior or senior standing, HDFS majors or minors, WGS majors or minors, FACS majors or pre-FACS majors only. Recommended: HDFS 341. {Also offered for graduate credit - see HDFS 662.}.

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: Junior or Senior standing. {Also offered for graduate credit - see HDFS 668.}.

HDFS 473. Teens at Risk. 2 Credits.

An investigation of opposing viewpoints about issues related to factors that put teens and their families at risk, including crime and violence, pregnancy and parenthood, substance abuse, school failure, and the consequences of risk behaviors.

HDFS 475. Children and Families Across Cultures. 3 Credits.

Study of developmental and family issues as viewed from a cross-cultural diversity perspective. {Also offered for graduate credit - see HDFS 675.}.

HDFS 477. Financial Counseling. 3 Credits.

Advanced analysis of family financial issues. Evaluation of alternative financial programs. Prereq: HDFS 357. {Also offered for graduate credit - see HDFS 677.}.

HDFS 478. Financial and Consumer Issues of Aging. 3 Credits.

Integration of economic and consumer problems of the elderly including income trends in retirement and health care. Recommended Prereq: 6 credits social science. This course is restricted to HDFS majors and minors or WGS majors or minors. {Also offered for graduate credit - see HDFS 678.}.

HDFS 481. Gender and Aging. 3 Credits.

Study of theory, research, and application of issues related to gender and the aging experience. Prereq: HDFS 230 or HDFS 360 or PSYC 250 or PSYC 471. {Also offered for graduate credit - see HDFS 681.}.

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 135 or HDFS 230 or HDFS 360 or PSYC 250 or PSYC 471. {Also offered for graduate credit - see HDFS 682.}.

HDFS 483. Developmentally Appropriate Practices from Birth Through Adolescence. 3 Credits.

This course will provide guidance in planning, implementing, and evaluating developmentally appropriate activities and programming from birth through adolescence including infancy, preschool-age, childhood, and adolescence A strong emphasis on careers from birth through adolescence in child development and family science will be incorporated into this course. Recommended Prereq: HDFS 320, 330, 450.

HDFS 484. Developmentally Appropriate Practices Across the Adult Lifespan. 3 Credits.

This course will provide guidance in planning, implementing, and evaluating developmentally appropriate activities and programming across the adult lifespan from emerging to later adulthood. A strong emphasis on family science careers working with adults, their families, and connecting the generations will be incorporated into this course. Prereq: HDFS 360.

HDFS 487. Practicum in Child Development Programs. 1-8 Credits.

Supervised on- or off-campus experience in early childhood settings. Application of theoretical and practical knowledge as a professional. Recommended Prereq: Grade of C or better in HDFS 330, HDFS 341, HDFS 371, HDFS 381, first aid and infant/toddler CPR certification.

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 624. Observation and Assessment of Children. 3 Credits.**

Overview of observation/assessment of children for research and practice application. {Also offered for undergraduate credit - see HDFS 424.}.

HDFS 630. Topics in Cognitive Development. 3 Credits.

Understanding the fundamentals of cognitive development in children and adolescents. 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. {Also offered for undergraduate credit - see HDFS 430.}.

HDFS 635. Topics in Socioemotional Development. 3 Credits.

Understanding the fundamentals of socio-emotional development in children and adolescents. 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. {Also offered for undergraduate credit - see HDFS 435.}.

HDFS 648. Issues In Sexuality. 3 Credits.

Study of personal, interpersonal, and societal meanings of human sexuality. Decision making relevant to sexual behavior. Prereq: 6 credits social science. {Also offered for undergraduate credit - see HDFS 448.}.

HDFS 675. Children and Families Across Cultures. 3 Credits.

Study of developmental and family issues as viewed from a cross-cultural diversity perspective. {Also offered for undergraduate credit - see HDFS 475.}.

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 678. Financial and Consumer Issues of Aging. 3 Credits.

Integration of economic and consumer problems of the elderly including income trends in retirement and health care. Prereq: 6 credits social science. {Also offered for undergraduate credit - see HDFS 478.}.

HDFS 681. Gender and Aging. 3 Credits.

Study of theory, research, and application of issues related to women and the aging experience. {Also offered for undergraduate credit - see HDFS 481.}.

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 703. Research Methods in Human Development and Family Science. 3 Credits.**

Introduction to research methods in child development and marital and family relationships. Includes instrument selection/construction, data collection, interpretation of results, and proposal writing. Emphasis on the unique methodological features associated with the field.

HDFS 705. Quantitative Methods in Developmental Science. 3 Credits.

This course is an introduction to quantitative methods commonly used in research in developmental and family science. Areas covered will include basic univariate, bivariate, and multivariate analysis, including appropriate software, interpretation of results, and reading and writing technical research reports. Prereq: Graduate standing in HDFS or Developmental Science.

HDFS 710. Foundations of Youth Development. 1 Credit.

This course will examine the fundamentals of youth development and the youth development profession. Through this introduction to the field, students will explore the ethical, professional, and historical elements of youth development as it has evolved toward professionalization.

HDFS 711. Youth Development. 3 Credits.

An introduction to 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. The course will help students recognize and become familiar with the major issues and transitions of adolescents.

HDFS 712. Community Youth Development. 3 Credits.

Focuses upon community youth development from a strength-based approach. This approach is a holistic and dynamic understanding of youth and communities encompassing both individual development (i.e. positive youth development) and adolescents' interrelationships with their environments. Emphasis is placed upon research, theory, and practice.

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 in Cultural Contexts. 3 Credits.

This course will examine the cultural contexts that affect youth from within and outside the family. Students will be encouraged to think critically about society and culture, gain further knowledge of how ethnic groups fit historically into society, and examine how history has shaped the current cultural climate of the U.S.

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. Program Design, Implementation and Evaluation. 3 Credits.

Focuses on hands-on tools for conducting strategic planning, designing program logic model, and evaluating the performance of programs for youth and families. Students will develop knowledge through participating in a community-based project involving the practical application of program design and evaluation methods.

HDFS 718. Administration and Program Management. 3 Credits.

This course introduces students to the development, administration and management of youth-serving organizations.

HDFS 719. Youth Policy. 3 Credits.

This course examines federal and state policies that impact the developmental opportunities for youth. A guiding question that will be used to evaluate these existing (and prospective) policies is whether they contribute to, or act as barriers to desired developmental 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 755. Advanced Lifespan Development. 3 Credits.

Advanced study of current theory and research on physical, cognitive, social, and emotional development across the lifespan.

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 764. Family Economics. 3 Credits.

Overview of basic concepts and theories in family economics with emphasis on the economics situation of families in the United States.

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 774. Foundations of Couple and Family Therapy II. 3 Credits.

Study of theories and interventions that apply to work with couples in therapy. Other topics include sex therapy, domestic violence, issues related to gender, race, and class, and therapy with LGBT couples.

HDFS 776. Clinical Applications of Couple & Family Therapy II. 3 Credits.

This course explores ethical issues related to working with children; assessment of children; child play therapy; family play therapy; child abuse; and grief and loss within the context of sexism, racism, classism, and heterosexism. Coreq: In-depth study of current approaches to family therapy. Emphasis on constructivist approaches. Application in the clinical practice of marital and family therapy.

HDFS 777. Diagnosis and Assessment in Couple and Family Therapy. 3 Credits.

This course explores issues related to assessment and diagnosis in the treatment of individuals, couples, and families within the context of sexism, racism, classism, and heterosexism; and practical application of the DSM-IV-TR. Coreq: HDFS 794 Training in methods of diagnosis and assessment in mental health issues using DSM-IV criteria as applied to the discipline of marital and family therapy.

HDFS 780. Ethics and Professional Issues in Couple and Family Therapy. 3 Credits.

Study of ethical and professional issues in couple and family therapy. Focusing on legal, feminist, personal, and relational ethics. Exploring the influence of the contextual issues of racism, classism, sexism, and heterosexism on ethical practice.

HDFS 783. Dynamics of Parent-Child Relations. 3 Credits.

Study of selected theories and research in parent-child relations. Emphasis on interaction between adults and children from infancy to youth. Prereq: HDFS 784, HDFS 785.

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 812. Advanced Human Development: Birth Through Childhood. 3 Credits.

Critical examination of current research and theories on child development. Emphasis on applying theoretical understanding and knowledge of the current empirical research base to current issues facing children and families.

HDFS 814. Advanced Human Development: Adolescence Through Early Adulthood. 3 Credits.

This course examines the physical, cognitive, emotional, and social changes that occur in the lives of individuals as they progress through adolescence and early adulthood. We will also examine how these changes affect or influence individuals, families, romantic partners, researchers, professionals, and therapists.

HDFS 816. Advanced Human Development III: Middle through Late Adulthood. 3 Credits.

Critical examination of current research and theories on development in middle and late adulthood. Emphasis on applying theoretical understanding and knowledge of the current empirical research base to current issues facing older adults.

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: PSYC 762.

HDFS 873. Social Justice Approaches to Couple and Family Therapy. 3 Credits.

This course will cover approaches to couple and family therapy that are specifically designed to address the ways in which larger social systems negatively influence the lives of individuals, couples, and families. In particular, this course will focus on helping students learn how to use these approaches to counter the effects of social inequalities in their work with clients.

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.

HDFS 875. Research Methods in Couple and Family Therapy. 3 Credits.

This course explores quantitative, qualitative, and mixed-method methodologies within the context of couple and family therapy research. Co-req: HDFS 801.

HDFS 880. Supervision and Teaching Couple and Family Therapy. 3 Credits.

Critical analysis of theories and practices of feminist, social justice informed pedagogical approaches to effective and engaging teaching and learning in couple and family therapy. Prereq: CFT doctoral students only.

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.

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. Study Abroad. 1-15 Credits.

HUM 294. Individual Study. 1-5 Credits.

HUM 299. Special Topics. 1-5 Credits.

HUM 379. Study Tour Abroad. 1-6 Credits.

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. Study Abroad. 1-15 Credits.

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 491. Seminar. 1-5 Credits.

HUM 491H. Seminar. 3 Credits.

HUM 492. Study Abroad. 1-15 Credits.

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. Study Abroad. 1-15 Credits.

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. S.

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. 1 recitation, 1 two-hour laboratory. F.

IME 379. Study Tour Abroad. 1-6 Credits.

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. F.

IME 391. Seminar. 1-3 Credits.

IME 392. Study Abroad. 1-15 Credits.

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. F/2 (even years) {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. S/2 (odd years). 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. {Also offered for graduate credit - see IME 629.}.

IME 430. 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. Prereq: IME 330. F {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. S {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. S.

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. 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 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. F {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. F/2 (odd years) {Also offered for graduate credit - see IME 651.}.

IME 452. Integrated Industrial Information Systems. 3 Credits.

Integration of technical, business, and operational information for status, progress, and decision making in product development, manufacturing, and logistical support of product and customers. Prereq: IME 450. S {Also offered for graduate credit - see IME 652.}.

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. S/2 (even years) {Also offered for graduate credit - see IME 653.}.

IME 455. Management of People Systems. 2 Credits.

Study of traditional management functions (planning, organizing, influencing, and controlling) in the context of engineering and management system interactions. Emphasis on communication skills, teaming, job design, leadership, facilitation, and improving employee productivity. Prereq: Junior standing. F {Also offered for graduate credit - see IME 655.}.

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. S {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. F, S {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. S {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. F/2 (even years) {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. S/2 (odd years) {Also offered for graduate credit - see IME 663.}.

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. S {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. S {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. F {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 three-hour laboratory. Prereq: IME 311, IME 330, PHYS 252. F {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. S {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: Senior standing. S.

IME 491. Seminar. 1-5 Credits.**IME 492. Study Abroad. 1-15 Credits.****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. F/2 (even years) {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. S/2 (odd years). Cross-listed with ECE 627. {Also offered for undergraduate credit - see IME 427.}.

IME 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 ECE 629. {Also offered for undergraduate credit - see IME 429.}.

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. F {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. S {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. F {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. F/2 (odd years) {Also offered for undergraduate credit - see IME 451.}.

IME 652. Integrated Industrial Information Systems. 3 Credits.

Integration of technical, business, and operational information for status, progress, and decision making in product development, manufacturing, and logistical support of product and customers. S {Also offered for undergraduate credit - see IME 452.}.

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. S/2 (even years) {Also offered for undergraduate credit - see IME 453.}.

IME 655. Management Of People Systems. 2 Credits.

Study of traditional management functions (planning, organizing, influencing, and controlling) in the context of engineering and management system interactions. Emphasis on communication skills, teaming, job design, leadership, facilitation, and improving employee productivity. Prereq: Junior standing. F {Also offered for undergraduate credit - see IME 455.}.

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. S {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. F, S {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. S {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. F/2 (even years) {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. S/2 (odd years) {Also offered for undergraduate credit - see IME 463.}.

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. S {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. S {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. F {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 three-hour laboratory. F {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. S {Also offered for undergraduate credit - see IME 485.}.

IME 690. Graduate Seminar. 1-3 Credits.**IME 696. Special Topics. 1-5 Credits.****IME 711. Advanced Human Factors Engineering. 3 Credits.**

Research-based study of current human factors engineering problems. Students will review current human factors topics, design and conduct research studies, and produce technical papers reporting results. Prereq: IME 611 and IME 660. F/2 (odd years).

IME 720. Surface Engineering. 3 Credits.

Engineering surfaces: structure and properties. Tribology: surface contacts, friction and wear. Surface heat treatment. Solid, liquid and vapor phase deposition processes for tribological coatings. Emerging processes: nano-engineered and diamond-based coatings. Evaluation and characterization of tribological coatings. Prereq: Graduate standing in engineering or science. F (odd years).

IME 740. Advanced Engineering Economy. 3 Credits.

Advanced topics in engineering economy including replacement analysis, capital budgeting, income tax effects on equipment selection, probabilistic models, and manufacturing costing. Prereq: IME 640. F/2 (odd years).

IME 761. Quality Engineering. 3 Credits.

Study and application of advanced statistical tools and techniques for defining, monitoring and improving quality of products, processes and services: statistical control charts, process capability analysis, acceptance sampling of variables and attributes, application of design-of-experiments for product and process optimization, response surface methodology, Taguchi methods. Prereq: IME 661. F/2 (odd years).

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 766. Robust Design Methods. 3 Credits.

Robust design, principles of quality engineering, experimental methods, probabilistic and statistical analysis, product development process, identification of critical design parameters, and optimization methods for product/process design in manufacturing and service industries. Prereq: IME 765.

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 772. Advanced Simulation. 3 Credits.

In-depth study of special purpose simulation languages to model, analyze, and design industrial and engineering systems. Stochastic and deterministic methods are included. Prereq: IME 672. S (even years).

IME 773. Advanced Operations Research Topics. 3 Credits.

Study of the theory and applications of linear programming, network flows, and nonlinear programming. Prereq: IME 670. F/2 (odd years).

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 782. Robotics/CAD/CAM/Control Systems. 3 Credits.

Study of automation, integration of fabrication, and assembly systems. Includes automated material handling and intelligent control systems. Prereq: IME 682. S/2 (odd years).

IME 784. Computer Integrated Manufacturing. 3 Credits.

Study of the continuum of integrated manufacturing processes where computer technology is incorporated in the conception, design, planning, and fabrication of a good or service. The study of philosophy and methods of systematically building flexible and efficient production systems. Prereq: IME 682. S/2 (even years).

IME 785. Facilities Location. 3 Credits.

Theory and methods of locating facilities. Domains include plant and warehouse siting, emergency service sites, vehicle and hazardous material routing, distribution systems design. Topics include planar single and multi-facility models, network location problems, cyclical networks. Prereq: IME 670 or ENGR 770.

IME 786. Manufacturing Systems Analysis. 3 Credits.

Comprehensive analysis of complex issues in the technology and management of modern manufacturing systems and enterprises. Technological issues will impinge on product realization, production of goods, and manufacturing equipment and facilities; management issues addressed will be those drawn from operation of global production enterprises. Seminar format. Prereq: IME 630 or IME 631 (both preferred). S.

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. Study Tour Abroad. 1-6 Credits.

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. Study Abroad. 1-15 Credits.

Landscape Architecture (LA)

LA 171. Environmental Design I. 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.

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. Landscape Architecture Graphics. 3 Credits.**

This course will give some insight into the design approach used by landscape architects. It will explore the theories that influence landscape architecture and the manner in which these theories are transformed into physical environments via drawing and other graphic techniques. Prereq: LA or ARCH 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: LA major or minor.

LA 272. Parks & Open Spaces Studio. 6 Credits.

Continued design development in site organization and planning. Design issues in natural resources, land reclamation, construction technology, and rural development. Intermediate problem solving through two- and three-dimensional graphic techniques; continued oral and written communication skills. Prereq: LA major, LA 271.

LA 291. Seminar. 1-3 Credits.**LA 292. Study Abroad. 1-15 Credits.****LA 294. Individual Study. 1-5 Credits.****LA 299. Special Topics. 1-5 Credits.****LA 322. History of Landscape Architecture. 4 Credits.**

Global overview of the landscape developments from prehistoric civilizations through the 20th century using styles and trends. Emphasis on analyzing historic places and locations 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: Junior standing for non-majors.

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 379. Study Tour Abroad. 1-6 Credits.**LA 391. Seminar. 1-3 Credits.****LA 392. Study Abroad. 1-15 Credits.****LA 394. Individual Study. 1-5 Credits.****LA 396. Field Experience. 1-15 Credits.****LA 399. Special Topics. 1-5 Credits.****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. Study Abroad. 1-15 Credits.

LA 494. Individual Study. 1-5 Credits.

LA 496. Field Experience. 1-15 Credits.

LA 552. 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: Senior standing.

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.

Leadership (LEAD)

LEAD 125. Level I Leadership. 3 Credits.

This freshman level course develops the personal leadership abilities desired by recruiters and hiring decision makers. It prepares the individual to be highly capable on campus and later in an organization. College of Business consent required.

LEAD 205. Peer Leader Development. 2 Credits.

This course prepares second semester freshmen to act as peer leaders in BUSN 189. It develops the peer leadership skills these students will need to assist the freshmen to navigate the new terrain of college. College of Business consent required.

LEAD 206. Peer Leader Practicum. 1 Credit.

This course is the application course that follows LEAD 205. During the fall semester, each peer leader is accountable for providing leadership for approximately 15 freshmen during the semester. Prereq: LEAD 205.

LEAD 225. Level II Leadership. 3 Credits.

This sophomore level course develops the individual's ability to be simultaneously a good team player and a team leader. It prepares the individual for working on team projects using a service-learning approach.

LEAD 305. Global Leader Development. 2 Credits.

This course prepares students with the essential leadership competencies needed in a global environment. It provides the content lens for a global leadership experience. Prereq: Sophomore standing or higher.

LEAD 306. Global Leader Experience. 1 Credit.

This course presents students with the opportunity to experience the essential leadership competencies needed in a global environment. This course may be repeated up to three times to experience different global locations. Prereq: LEAD 305 with a grade of B or better.

LEAD 325. Level III Leadership. 3 Credits.

This junior level course begins the process of developing a leadership identity for each student. In addition, it allows for integration and application of earlier optional leadership courses. College of Business consent required.

LEAD 394. Individual Study. 1-5 Credits.

LEAD 425. Level IV Leadership. 3 Credits.

This senior level course builds upon and extends the junior level course. The students prepare learning materials for lower level leadership courses. In addition, students participate in an organizational simulation to practice their leadership competencies. Prereq: LEAD 325 with a grade of C or higher.

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 121. Introduction to Library Research. 1 Credit.

Basic information on libraries and their services. Exploration of sources of information in print and computer format; explanation of basic search strategies.

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. Study Abroad. 1-15 Credits.

LIB 294. Individual Study. 1-5 Credits.

LIB 299. Special Topics. 1-5 Credits.

LIB 379. Study Tour Abroad. 1-6 Credits.

LIB 391. Seminar. 1-3 Credits.

LIB 392. Study Abroad. 1-15 Credits.

LIB 394. Individual Study. 1-5 Credits.

LIB 399. Special Topics. 1-5 Credits.

LIB 491. Seminar. 1-5 Credits.

LIB 492. Study Abroad. 1-15 Credits.

LIB 494. Individual Study. 1-5 Credits.

LIB 496. Field Experience. 1-15 Credits.

LIB 499. Special Topics. 1-5 Credits.

Management (MGMT)

MGMT 301. Management for Non-Business Majors. 3 Credits.

This course introduces non-business majors and non-degree seeking students to the basic functions and activities of managers. Students will become familiar with classical management principles, as well as modern management techniques, based on the concepts of planning, organizing, leading and controlling. Credit awarded only for MGMT 301 or MGMT 320 (formerly BUSN 350), not both.

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. Credit awarded only for MGMT 301 or MGMT 320 (formerly BUSN 350), not both.

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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MGMT 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 630.}

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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 654.}.

MGMT 461. 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average. {Also offered for graduate credit - see MGMT 661.}.

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, Jr or Sr classification, 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 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 651. 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. {Also offered for undergraduate credit - see MGMT 451.}.

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 750. Advanced Organizational Behavior. 3 Credits.**

Study of theory and current management research to facilitate leadership of individual and small-group behavior in organizations. Topics include motivation, reward, job satisfaction, stress, communication, and conflict resolution.

MGMT 751. Advanced Operations Management. 3 Credits.

Advanced study of decision-making directed at creating, producing, and bringing goods and services to market under uncertain business conditions. Includes techniques from project/supply chain/quality/inventory management, forecasting, and aggregate planning.

MGMT 752. Organizational Restructuring. 3 Credits.

This course aims to provide students with a fundamental understanding of organizational restructuring, and exposes them to a broad range of restructuring activities, such as mergers and acquisitions, reorganization, and downsizing. The emphasis is placed on the driving forces and mechanisms of organizational restructuring and its impacts on organizations and employees.

MGMT 793. Individual Study. 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 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 CSCI 277.

MIS 291. Seminar. 1-3 Credits.**MIS 292. Study Abroad. 1-15 Credits.****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. 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 391. Seminar. 1-3 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 392. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 394. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 412. Computer Crime, Forensics, and Investigation. 3 Credits.

Introduction to the technical and legal aspects of obtaining and analyzing digital information for use as evidence in civil, criminal, or administrative cases. Prereq: MIS 320 and ACCT 410 or MIS 376 or CSCI 372 and students must be College of Business students who have been admitted to the professional program and have a cumulative GPA of 2.5 or higher. Cross-listed with ACCT.

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 460. Enterprise Infrastructure I. 3 Credits.

This course provides an intensive hands-on coverage of the design, implementation and maintenance of a basic enterprise information technology infrastructure. The role of network administrator and security will be emphasized. Prereq: MIS 375 or CSCI 366 and MIS 376 or CSCI 459.

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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 479. Decision Support and Intelligent Systems. 3 Credits.

Information system support and modeling of the decision-making process via expert systems, neural networks, and hybrid intelligent systems are the primary focus of this course. The state-of-the-art in knowledge management will be explored. Prereq: CSCI 228 and MIS 320.

MIS 491. Seminar. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 492. Study Abroad. 1-15 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

MIS 494. Individual Study. 1-5 Credits.

Restricted to College of Business professional major or minor, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, and a 2.50 minimum NDSU grade point average.

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.

Marketing (MRKT)

MRKT 301. Marketing for Non-Business Majors. 3 Credits.

This course introduces non-business majors and non-degree seeking students to the four basic areas of marketing: product, price, place and promotion. This course will also cover consumer behavior and strategic marketing. Credit awarded only for MRKT 301 or MRKT 320 (formerly BUSN 360), not both.

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, Jr or Sr classification, 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, junior standing 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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 with a junior or senior classification and a 2.50 minimum NDSU grade point average. {Also offered as a graduate course: MRKT 634.}.

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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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, Jr or Sr classification, 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 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 620. 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. {Also offered for undergraduate credit - see MRKT 420.}.

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 760. Strategic Marketing Management. 3 Credits.

Focus on the conceptual framework, managerial approach and analysis of understanding customer value and deploying marketing resources to communicate and deliver value in uncertain and dynamic marketplace environments.

MRKT 793. Individual Study. 1-5 Credits.

Master of Public Health (MPH)

MPH 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. MPH students only.

MPH 704. Leading and Managing Public Health Systems. 3 Credits.

A pragmatic study of the issues, constituents, processes, and tools of public health leadership and management.

MPH 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 MPH program.

MPH 710. Healthcare Delivery in the United States. 3 Credits.

Introduction to health professions, health care delivery systems, financing, health promotion, and behavioral issues.

MPH 712. Health Outcomes Research. 3 Credits.

This course provides MPH students enrolled in the public health in clinical systems track with the skills and tools necessary to assess studies and conduct basic assessment in a variety of health care settings. Prereq: MPH 731 and MPH 751.

MPH 715. Emergency Management for Public Health Professionals. 3 Credits.

This course provides an overview of emergency management for public health professionals and addresses the public health nexus in emergency management activities at the federal, state and local level.

MPH 720. Environmental Health. 3 Credits.

Analysis of key concepts, principles, and applications of the primary natural and social science disciplines that underpin the core of environmental health.

MPH 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.

MPH 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.

MPH 736. Principles of Infectious Disease Management II. 3 Credits.

The course will build on MPH 735, Principles of Infectious Disease Management I and focus on the epidemiology, clinical presentation, treatment, and control of the major communicable diseases. Prereq: MPH 735.

MPH 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.

MPH 751. Essentials in Epidemiology. 3 Credits.

Emphasis on application of the principles of epidemiology as applied to the investigation and prevention of individual and population health problems.

MPH 755. Integrating Primary Care and Public Health. 3 Credits.

This course explores the intersections of public health and primary care and their roles in addressing personal and population health issues. Prereq: MPH students only.

MPH 765. Cultural Competence Health Care. 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. MPH students only.

MPH 771. American Indian Health Policy. 3 Credits.

The course will provide a detailed overview of the unique policy issues that form the legal basis for provision of public health and healthcare services to American Indians and Alaska Natives. Prereq: Admission to the MPH program.

MPH 772. American Indian Health Disparities. 3 Credits.

The course will provide a detailed overview of the basis for and regional differences in American Health Disparities. Strategies to reduce disparities will be highlighted. Prereq: Admission to the MPH program.

MPH 773. Cultural Competence in Indian Health. 3 Credits.

The course will provide a detailed overview of numerous American Health Cultures in the United States and Canada. Cultural aspects of health and strategies to develop culturally appropriate health programs will be highlighted. Prereq: Admission to MPH program.

MPH 774. Research Issues in Tribal Communities. 3 Credits.

This course will provide a detailed overview of the numerous unique considerations for conducting health-related research in tribal communities. These issues include tribal sovereignty, tribal approval processes, historical distrust of research, and cultural factors. Prereq: Admission to MPH program.

MPH 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 MPH program.

MPH 790. Graduate Seminar. 1-5 Credits.**MPH 793. Individual Study. 1-5 Credits.****MPH 794. Practicum. 1-8 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 735. Optoelectronics Materials and Processing. 3 Credits.

This course covers the basic principles of semiconductor optoelectronic devices and their processing techniques. Students will learn the methods used for their fabrication and also current applications and limits of such technologies in nanotechnology.

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 783. Nanomechanics. 3 Credits.

Covers essential tools (quantum mechanics, molecular dynamics, statistical physics, continuum mechanics) used at the nanoscale. The course will present methods that bridge atomistic and continuum models and discuss these techniques in the context of material design.

MNT 790. Graduate Seminar. 1-5 Credits.**MNT 793. Individual Study. 1-5 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.

MATH 101. Elementary Algebra. 3 Credits.

Fundamental operations, factoring, fractions, exponents and radicals, equations. For students with little or no background in algebra. Offered through Continuing Education. Special fee required. Does not satisfy any requirements for graduation.

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. 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. 2 Credits.

Includes content of MATH 128 with the addition of vectors in n -space, subspaces, homogeneous systems, linear independence, rank, and dimension. Prereq: MATH 105 or MATH 107. Credit awarded only for MATH 128 or MATH 129, not both.

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, 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 preparing the student for the Putnam Mathematics competition. May be repeated for credit. 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. Study Tour Abroad. 1-6 Credits.**MATH 391. Seminar. 1-3 Credits.****MATH 392. Study Abroad. 1-15 Credits.****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. {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. Linear Algebra. 3 Credits.

Vector spaces, linear transformations, eigenvalues and eigenvectors, canonical forms, inner product spaces, and selected applications. Prereq: MATH 270. {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 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 445. Differential Geometry. 3 Credits.

Basic properties of curves and surfaces, Frenet equations, the Gauss Map, intrinsic geometry of surfaces, geodesics, Gauss-Bonnet Theorem, and applications. Prereq: MATH 265 and MATH 270. {Also offered for graduate credit - see MATH 645.}

MATH 446. Introduction to Topology. 3 Credits.

Topology of Euclidean space, metric spaces, topological spaces, bases and neighborhoods, Hausdorff property, continuity, homeomorphisms and embeddings, connectivity, and compactness. Prereq: MATH 270. {Also offered for graduate credit - see MATH 646.}

MATH 450. Real Analysis I. 3 Credits.

This course will cover sequences and convergence in \mathbb{R} , continuity, uniform convergence, compactness, fixed point theorems, differentiability and other selected topics. Prereq: MATH 270. {Also offered for graduate credit - see MATH 650.}

MATH 451. Real Analysis II. 3 Credits.

Riemann integration, spaces of continuous functions, convergence theorems, multiple integration and Fubini's Theorem and selected topics. Prereq: MATH 450. {Also offered for graduate credit - see MATH 651.}

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 460. Intensive Mathematica. 1 Credit.

Thorough overview of the general purpose mathematical software MATHEMATICA: numerical and symbolic calculations for algebra and linear algebra, single and multivariable calculus, ordinary and partial differential equations, 2D- and 3D-graphics, animation, word processing. 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 420 or MATH 472. {Also offered for graduate credit - see MATH 673.}

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. {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 488. Numerical Analysis I. 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 489. Numerical Analysis II. 3 Credits.

Numerical solutions of linear and nonlinear systems, eigenvalue problems for matrices, boundary value problems for ordinary differential equations, selected topics. Prereq: MATH 429, MATH 488. {Also offered for graduate credit - see MATH 689.}

MATH 491. Seminar. 1-5 Credits.**MATH 492. Study Abroad. 1-15 Credits.****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. Linear Algebra. 3 Credits.

Vector spaces, linear transformations, eigenvalues and eigenvectors, canonical forms, inner product spaces, and selected applications. {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 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 645. Differential Geometry. 3 Credits.

Basic properties of curves and surfaces, Frenet equations, the Gauss Map, intrinsic geometry of surfaces, geodesics, Gauss-Bonnet Theorem, and applications. {Also offered for undergraduate credit - see MATH 445.}.

MATH 646. Introduction to Topology. 3 Credits.

Topology of Euclidean space, metric spaces, topological spaces, bases and neighborhoods, Hausdorff property, continuity, homeomorphisms and embeddings, connectivity, and compactness. {Also offered for undergraduate credit - see MATH 446.}.

MATH 650. Real Analysis I. 3 Credits.

Sequences and convergence in \mathbb{R} , continuity, uniform convergence, compactness, fixed point theorems, differentiability and other selected topics. {Also offered for undergraduate credit - see MATH 450.}.

MATH 651. Real Analysis II. 3 Credits.

Riemann integration, spaces of continuous functions, convergence theorems, multiple integration and Fubini's Theorem and selected topics. Prereq: MATH 650. {Also offered for undergraduate credit - see MATH 451.}.

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 660. Intensive Mathematica. 1 Credit.

Thorough overview of the general purpose mathematical software MATHEMATICA: numerical and symbolic calculations for algebra and linear algebra, single and multivariable calculus, ordinary and partial differential equations, 2D- and 3D-graphics, animation, word processing. {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 688. Numerical Analysis I. 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 689. Numerical Analysis II. 3 Credits.

Numerical solutions of linear and nonlinear systems, eigenvalue problems for matrices, boundary value problems for ordinary differential equations, selected topics. Prereq: MATH 629, MATH 688. {Also offered for undergraduate credit - see MATH 489.}.

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: groups, rings, fields, Galois theory, and selected advanced topics. Prereq: MATH 621.

MATH 721. Algebra II. 3 Credits.

Graduate level survey of algebra: groups, rings, fields, Galois theory, and selected advanced topics. Prereq: MATH 621.

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 746. Topology I. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizable, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 646.

MATH 747. Topology II. 3 Credits.

Topological spaces, convergence and continuity, separation axioms, compactness, connectedness, metrizable, fundamental group and homotopy theory. Advanced topics may include homology theory, differential topology, three-manifold theory and knot theory. Prereq: MATH 646.

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 651.

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 651.

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 751.

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 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 721.

MATH 825. Theory Of Rings. 3 Credits.

The ideal theory of commutative rings, structure of (non-commutative) rings, and selected advanced topics. Prereq: MATH 721.

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 836. Discrete Mathematics. 3 Credits.

Combinatorial reasoning, generating functions, inversion formulae. Topics may include design theory, finite geometry, Ramsey theory, and coding theory. Advanced topics may include cryptography, combinatorial group theory, combinatorial number theory, algebraic combinatorics, $(0,1)$ -matrices, and finite geometry. Prereq: MATH 636.

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 721, MATH 751.

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 651.

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 651.

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 651 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 689.

MATH 899. Doctoral Dissertation. 1-15 Credits.

Mechanical Engineering (ME)

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. Repeated course opportunity exists for failing grades only. 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 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. Study Abroad. 1-15 Credits.

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. 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 341. Mechanics of Machinery. 3 Credits.

Application of solid mechanics principles and computer methods in designing mechanisms for function and performance. Prereq: ME 213 and admission to professional program.

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. Introduction to Mechanical Engineering Profession. 1 Credit.

A study of the effect of corporate structure and the application of economic analysis, scheduling procedures and available corporate resources to complete an engineering design program on time and within budget. Prereq: Admission to the professional program.

ME 379. Study Tour Abroad. 1-6 Credits.**ME 391. Seminar. 1-3 Credits.****ME 392. Study Abroad. 1-15 Credits.****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 303, ME 223 and admission to professional program. F, S {Also offered for graduate credit - see ME 612.}.

ME 415. Emerging Technologies in Mechanical Engineering. 3 Credits.

Fundamental principles and applications of emerging technologies, including micro/nanofabrication, energy storage and conversion devices, nanotechnology, sensors, and biomedical engineering. Prereq: CHEM 122, PHYS 120 or PHYS 251, MATH 259 and admission to professional program.

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 423. Intermediate Mechanics of Materials. 3 Credits.

Stress analysis, failure criteria and methods, composites, energy methods, symmetric and unsymmetric bending, thick- and thin-walled cylinders, curved beams and plastic deformation. Prereq: ME 223 and admission to professional program. {Also offered for graduate credit - see ME 623.}.

ME 433. Composite Materials Science and Engineering. 3 Credits.

This course covers composite materials science and technologies which are combinations of raw materials, interfacial issues, curing science and basic relationship between raw materials and properties of composites. Prereq: ME 331 and admission to professional program. {Also offered for graduate credit - see ME 633.}.

ME 435. Plastics and Injection Molding Manufacturing. 3 Credits.

See Industrial and Manufacturing Engineering for description. {Also offered for graduate credit - see ME 635.}.

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 energy renewable technology, solar thermal energy systems, solar photovoltaic systems, wind to electric energy conversion systems, biomass energy resources and conversion processes, urban waste to energy from pyrolysis plants, hydrogen energy and fuel cells. Prereq: ME 350 or ME 351. {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: ME 412 or ME 475 and admission to 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 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 482. Fuel Cell Science and Engineering. 3 Credits.

Fundamental principles, technologies, and applications of fuel cells, and emerging class of energy storage/conversion devices. Prereq: CHEM 121 and ME 350 or ME 351 and admission to professional program. {Also offered for graduate credit - see ME 682.}.

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. Study Abroad. 1-15 Credits.****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 623. Intermediate Mechanics of Materials. 3 Credits.

Stress analysis, failure criteria and methods, composites, energy methods, symmetric and unsymmetric bending, thick- and thin-walled cylinders, curved beams and plastic deformation. {Also offered for undergraduate credit - see ME 423.}.

ME 633. Composite Materials Science and Engineering. 3 Credits.

This course covers composite materials science and technologies which are combinations of raw materials, interfacial issues, curing science and basic relationship between raw materials and properties of composites. {Also offered for undergraduate credit - see ME 433.}.

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 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 energy renewable technology, solar thermal energy systems, solar photovoltaic systems, wind to electric energy conversion systems, biomass energy resources and conversion processes, 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 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 682. Fuel Cell Science and Engineering. 3 Credits.

Fundamental principles, technologies, and applications of fuel cells, and emerging class of energy storage/conversion devices. {Also offered for undergraduate credit - see ME 482.}

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. Study Abroad. 1-15 Credits.

MLS 294. Individual Study. 1-3 Credits.

MLS 299. Special Topics. 1-5 Credits.

MLS 379. Study Tour Abroad. 1-6 Credits.

MLS 391. Seminar. 1-3 Credits.

MLS 392. Study Abroad. 1-15 Credits.

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. Study Abroad. 1-15 Credits.

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 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. Study Abroad. 1-15 Credits.****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. Prereq: BIOL 150 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 352. General Microbiology II. 3 Credits.

Further exploration of microbiological concepts introduced in MICR 350. Topics include molecular structure, physiology, metabolism, growth and microbial genetics. Prereq: MICR 350.

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 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. Study Tour Abroad. 1-6 Credits.**MICR 391. Seminar. 1-3 Credits.****MICR 392. Study Abroad. 1-15 Credits.****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 474. Epidemiology. 3 Credits.

Study of the distribution and dynamics of disease in populations. Prereq: STAT 330. {Also offered for graduate credit - see MICR 674.}

MICR 475. Animal Virology. 3 Credits.

The biology of animal viruses with emphasis on virus replication and pathogenesis. Prereq: MICR 350 and MICR 470. {Also offered for graduate credit - see MICR 675.}

MICR 480. Bacterial Physiology. 3 Credits.

Composition and function of eubacterial and archaeobacterial cell structure. Nutrition and nutrient transport in bacteria. Principles of energy-yielding carbohydrate metabolism, bacterial fermentation, and respiration. 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. Prereq: BIOC 460. Recommended: STAT 330. {Also offered for graduate credit - see MICR 681.}

MICR 482. Bacterial Genetics & Phage. 3 Credits.

Bacterial genetics as it pertains to antibiotic resistance, genetic testing and manipulation for biotechnological applications. Prereq: MICR 350. Coreq: BIOC 460. {Also offered for graduate credit - see MICR 682.}

MICR 486. Capstone Experience in Microbiology. 3 Credits.

The capstone experience course is a culmination of all required coursework in the major assisting students in broadening and integrating the total experience of the microbiology major. Prereq: MICR 350, MICR 350L, Microbiology majors only and senior standing, semester of graduation.

MICR 491. Seminar. 1-5 Credits.**MICR 492. Study Abroad. 1-15 Credits.****MICR 493. Undergraduate Research. 1-5 Credits.****MICR 494. Individual Study. 1-5 Credits.****MICR 496. Field Experience. 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 674. Epidemiology. 3 Credits.

Study of the distribution and dynamics of disease in populations. {Also offered for undergraduate credit - see MICR 474.}.

MICR 675. Animal Virology. 3 Credits.

The biology of animal viruses with emphasis on virus replication and pathogenesis. {Also offered for undergraduate credit - see MICR 475.}.

MICR 680. Bacterial Physiology. 3 Credits.

Composition and function of eubacterial and archaeobacterial cell structure. Nutrition and nutrient transport in bacteria. Principles of energy-yielding carbohydrate metabolism, bacterial fermentation, and respiration. {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. Bacterial Genetics and Phage. 3 Credits.

Bacterial genetics as it pertains to antibiotic resistance, genetic testing and manipulation for biotechnological applications. {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 750. Advanced Topics in Epidemiology. 3 Credits.

Distribution and dynamics of disease in populations, and factors contributing to the costs of foodborne illness and its prevention. Three lectures. Prereq: MICR 674.

MICR 752. Advanced Food Microbiology. 3 Credits.

Molecular methods for detection and subtyping of foodborne pathogens and spoilage organisms.

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 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. Indiv 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 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 one time only. F, S.

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. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.**MS 391. Seminar. 1-3 Credits.****MS 392. Study Abroad. 1-15 Credits.****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. Study Abroad. 1-15 Credits.****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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

LANG 108. Studies in American Language and Culture. 3-5 Credits.

Studies of American language and culture with a focus on content designed to equip international students to effectively adapt to the American university environment. May be repeated for credit. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Does not satisfy any requirements for graduation.

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. Study Abroad. 1-15 Credits.****LANG 294. Individual Study. 1-5 Credits.****LANG 299. Special Topics. 1-5 Credits.****LANG 379. Study Tour Abroad. 1-6 Credits.****LANG 391. Seminar. 1-3 Credits.****LANG 392. Study Abroad. 1-15 Credits.****LANG 394. Individual Study. 1-5 Credits.****LANG 399. Special Topics. 1-5 Credits.****LANG 491. Seminar. 1-5 Credits.****LANG 491H. Seminar. 1-3 Credits.****LANG 492. Study Abroad. 1-15 Credits.****LANG 494. Individual Study. 1-5 Credits.****LANG 496. Field Experience. 1-15 Credits.****LANG 499. Special Topics. 1-5 Credits.****LANG 696. Special Topics. 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 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 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 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. Study Abroad. 1-15 Credits.****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 & Techniques. 2 Credits.

Methods and materials for directing, charting, and fielding a high school marching band.

MUSC 358. Jazz Methods. 2 Credits.

History, methods, and materials for teaching jazz styles and improvisation.

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 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. Study Tour Abroad. 1-6 Credits.**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. Study Abroad. 1-15 Credits.****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 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. {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 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. Study Abroad. 1-15 Credits.****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 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. Prereq: Permission of instructor. {Also offered for undergraduate credit - see MUSC 443.}.

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. 3 Credits.

A survey of diction training in English, Italian, 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 725. English and German Diction. 2 Credits.

Advanced training in English and German diction. Prereq: MUSC 705 or equivalent by demonstration.

MUSC 726. Italian and French Diction. 2 Credits.

Advanced training in Italian and French diction. Prereq: MUSC 705 or equivalent by demonstration.

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 732. Applied Collaborative Study. 1-4 Credits.

Private lessons in collaborative piano, with collaborative performance components. May be repeated for credit.

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 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 Music History. 3 Credits.

In-depth historical study of Baroque musical styles and genres through critical listening, discussions, and student and instructor presentations.

MUSC 742. Classical Music History. 3 Credits.

In-depth historical study of 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 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 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. Indiv 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. Study Tour Abroad. 1-6 Credits.

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. Scenarios in Natural Resources Management. 2 Credits.

An interdisciplinary course designed to understand the driving forces that will shape future natural resource management actions and philosophies. {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 432. Environmental Impact Statement. 2 Credits.

A comprehensive overview of the Environmental Impact Statement (EIS) planning process, document preparation, and project management. {Also offered for graduate credit - see NRM 632.}.

NRM 453. Rangeland Resource/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 336 or NRM 225 or RNG 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 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 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. Scenarios in Natural Resources Management. 2 Credits.

An interdisciplinary course designed to understand the driving forces that will shape future natural resource management actions and philosophies. {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 632. Environmental Impact Statement. 2 Credits.

A comprehensive overview of the Environmental Impact Statement (EIS) planning process, document preparation, and project management. {Also offered for undergraduate credit - see NRM 432.}.

NRM 653. Rangeland Resource/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 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 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 730. Environmental Law. 1 Credit.

Overview of the subject of environmental law.

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/Coop. 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 899. Doctoral Dissertation. 1-15 Credits.

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 240. Nursing as a Scholarly Profession. 3 Credits.

Introduction to the practice of professional nursing. The course focuses on the philosophy of the nursing program, the nature of the nursing profession and utilization of the scientific process. Prereq: NURS 250, NURS 360 and admission to 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. Study Abroad. 1-15 Credits.

NURS 294. Individual Study. 1-5 Credits.

NURS 299. Special Topics. 1-5 Credits.

NURS 340. Leadership & Ethical Reflection. 2 Credits.

This course presents principles of leadership in the nursing profession and in civic life. The role of ethical reflection as an essential component of professional practice is discussed. Prereq: second year level nursing courses and admission to program.

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: second year level nursing courses (NURS 210, NURS 250, NURS 251, NURS 252 and NURS 360) and admission to program.

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: second year level nursing courses (NURS 210, NURS 250, NURS 251, NURS 252 and NURS 360) and admission to program.

NURS 352. Family Nursing I. 5 Credits.

This course focuses on nursing care and health promotion for the childbearing family, and includes identification and care of high-risk clients. Prereq: second year level nursing courses, NURS 341, NURS 342, PHRM 300 and admission to program.

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: Admission to program.

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: second year level nursing courses, NURS 341, NURS 342, PHRM 300 and admission to program.

NURS 372. Integrated Family Nursing. 3 Credits.

Provides the student opportunity to integrate prior learning about pediatric and obstetrical care with an increased knowledge of family dynamics and cultural influences. Prereq: Licensure as practical nurse, admission to program.

NURS 379. Study Tour Abroad. 1-6 Credits.**NURS 391. Seminar. 1-3 Credits.****NURS 392. Study Abroad. 1-15 Credits.****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: second year level nursing courses, NURS 341, NURS 342, PHRM 300 and admission to program.

NURS 403. Adult Health Nursing II. 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 341, NURS 342, PHRM 300 and admission to program.

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: second and third year level nursing courses (NURS 240, NURS 250, NURS 251, NURS 252, NURS 341, NURS 342, NURS 352, NURS 360, NURS 362, NURS 402, NURS 403, NURS 460 and NURS 499) and admission to program.

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 240 or NURS 360.

NURS 407L. Adult Health: Complex Problems Clinical. 2 Credits.

This course focuses on care of patients in a variety of Adult Health settings including medical/surgical and intensive care units with a focus on the etiology, pathophysiologic mechanisms, and organization of nursing care. Prereq: NURS 407.

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 430. Nursing Management. 2 Credits.

Study of concepts and issues related to management and leadership in professional nursing. Prereq: second year level nursing courses, NURS 340, NURS 341, NURS 342 and admission to program.

NURS 440. Nursing Issues & Career Development. 2 Credits.

This course presents an overview of contemporary nursing issues and a guide for career development. Prereq: NURS 340.

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: NURS 240, NURS 250, NURS 251, NURS 252, NURS 341, NURS 342, NURS 352, NURS 360, NURS 362, NURS 402, NURS 403, NURS 460 and NURS 499 and admission to program. Co-req: NURS 404, NURS 406.

NURS 452. Professional Practice Synthesis. 2 Credits.

This is the capstone course for the baccalaureate nursing program student who is a practicing registered nurse. Focus is the integration and application of professional nursing concepts. Emphasis is on demonstration of application of program outcomes. Open to registered nurses only. Co-req: NURS 340, 406 and unencumbered registered nurse license.

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 240, NURS 499.

NURS 491. Seminar. 1-5 Credits.

NURS 492. Study Abroad. 1-15 Credits.

NURS 494. Individual Study. 1-5 Credits.

NURS 496. Field Experience. 1-15 Credits.

NURS 499. Special Topics. 1-5 Credits.

NURS 618. Family Nursing Theory & Health Promotion. 3 Credits.

Theoretical foundations and research based interventions related to psychosocial effects of illness, health behaviors, health promotion and disease prevention. Critically examines patterns of health behaviors, influence of psychosocial issues, risk assessment, lifestyles, and developmental stages.

NURS 620. Advanced Practice Roles. 2 Credits.

Focus on the advanced practice nurse's role expectations. Includes an understanding of the profession, regulations and rules of advanced practice, scope of practice, legal ramifications of scope of practice, interdisciplinary, collaborative practice. Prereq: NURS 634P, NURS 641P.

NURS 623. The Nurse As Educator. 4 Credits.

Major study in selected area with an emphasis in research. Prereq: NURS 632.

NURS 624. Advanced Transcultural Nursing. 3 Credits.

Program planning to promote the health of diverse populations will be based on epidemiological data, theory and research. Students will select a specific age group or health problem within a population/cultural group to study in depth. Prereq: NURS 608.

NURS 640. Adult Nursing I. 3 Credits.

Evaluation and synthesis of advanced pathophysiology concepts applied to nursing and health related theories, and research related to client outcomes. Health and illness phenomena, symptom management, and nursing interventions will be reviewed. Prereq: NURS 612 and NURS 616.

NURS 640P. Adult Nursing Practicum I. 3-6 Credits.

Clinical opportunities for application of clinical experiences in a primary care setting. Theory, research and didactic learning experiences are incorporated in the students practice and supervised by a health care provider with expertise in the area of specialization. Prereq: NURS 640.

NURS 641. Adult Nursing II. 3 Credits.

Continuation of Adult Nursing I. Emphasis on clinical decision-making, teaching/learning theory and formulation of researchable questions for advanced nursing practice as an adult CNS. Prereq: NURS 640.

NURS 641P. Adult Nursing Practicum II. 3-6 Credits.

An extended practicum time allowing the student a chance to more fully integrate skills and knowledge learned through the graduate program. Emphasis will continue on consultation, program planning, education, health promotion, and prevention of disease/illness. Prereq: NURS 641.

NURS 690. Graduate Seminar. 1-3 Credits.

NURS 693. Individual Study. 1-5 Credits.

NURS 695. Field Experience. 1-15 Credits.

NURS 696. Special Topics. 1-5 Credits.

NURS 701. Theoretical Perspectives of the Discipline. 3 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.

NURS 702. 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 704. Nursing Research/Evidence Based Practice. 3 Credits.

Research in nursing includes an exploration of the research process and the methodologies appropriate to nursing.

NURS 706. Health Care Delivery Systems, Financing and Informatics. 3 Credits.

Analysis of health care system, financial management, use of informatics, and 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, promoting quality improvement and managing and utilizing health care information.

NURS 708. Transcultural & Social Perspectives. 3 Credits.

Develop understanding of diversities in races, cultures, individuals, families, communities, populations, lifestyles, gender, and age groups. Changing demographics will be analyzed, major health needs identified, and health promotion and disease prevention plans formulated.

NURS 715. Advanced Community Assessment. 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. Prereq: an inferential statistics course.

NURS 724. Curriculum Design in Nursing Education. 3 Credits.

Presents curriculum philosophies and methods of program development and evaluation that prepare the educator for designing learner centered curricula that meet professional and national standards. Prereq: NURS 701. Co-req: NURS 704.

NURS 725. Strategies for Teaching and Learning in Nursing Education. 3 Credits.

Exploration of theory and evidence based teaching strategies for nursing education. Strategies and methods for teaching nursing education in a variety of settings are studied. The use of different technological tools and methods of student assessment are evaluated. Prereq: NURS 724.

NURS 726. Evaluation and Assessment in Nursing Education. 3 Credits.

Principles of assessment, measurement, and evaluation related to nursing education are analyzed in this course. Topics relevant to evaluation and the assessment of individual learning are examined. Processes of faculty and program evaluation are examined as well as the measurement of program outcomes. Prereq: NURS 725.

NURS 728P. Nurse Educator Practicum I. 2 Credits.

Students apply principles of teaching, learning and assessment of student learning in selected learning settings under the guidance of course faculty and a preceptor. Prereq: NURS 726.

NURS 729P. Nurse Educator Practicum II. 3 Credits.

Students examine elements of the nursing program and participate in a faculty role under the supervision of course faculty and a program faculty preceptor. The focus of this practicum is participation in programmatic development, evaluation and assessment. Prereq: NURS 728P.

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 797S. Comprehensive Project. 1-6 Credits.**

An in-depth research study/project in a graduate student's field of study. Prereq: Graduate standing.

NURS 798. Master's Thesis. 1-10 Credits.**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 612.

NURS 814. Advanced Pathophysiology 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 II. 2 Credits.

Builds on the context from NURS 614 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 614.

NURS 820. Advanced Practice Roles. 2 Credits.

Scope of practice, legal parameters of advanced practice, collaborative and interdisciplinary practice in the advanced nursing role. Prereq: NURS 601, NURS 602, NURS 606.

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 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 612P, NURS 616.

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 633.

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 733.

NURS 834P. Family Primary Care: Residency II. 6 Credits.

Student synthesizes skills acquired in previous didactic and clinical courses, in particular NURS 733P, to provide diagnosis, treatment, and management of an increasingly varied group of clients. Prereq: NURS 634, NURS 733P.

NURS 835P. Practicum IV: FNP Role Integration. 4-8 Credits.

Application of skills and clinical experiences in primary care. Didactic learning is incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, PE, and lab will be integrated into evaluation of clients. Prereq: NURS 733P.

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 734.

NURS 836P. Practicum V: FNP Role Integration. 4-8 Credits.

Application of skills and clinical experiences in primary care. Didactic learning is incorporated in the student's practice, supervised by a health care provider who has documented expertise in the area of specialization. History, PE, and lab will be integrated into evaluation of clients. Culminating in 1020 hours of clinical experience. Prereq: NURS 735P.

NURS 850P. Family Primary Care: Specialty Practicum. 2 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 890. Seminar. 1-5 Credits.**NURS 893. Individual Study/Tutorial. 1-5 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. Study Abroad. 1-15 Credits.

PSCI 294. Individual Study. 1-5 Credits.

PSCI 299. Special Topics. 1-5 Credits.

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. Study Tour Abroad. 1-6 Credits.

PSCI 391. Seminar. 1-3 Credits.

PSCI 392. Study Abroad. 1-15 Credits.

PSCI 394. Individual Study. 1-5 Credits.

PSCI 399. Special Topics. 1-5 Credits.

PSCI 400. Vaccinology Research Experience. 1 Credit.

Research-based course covering the principles and techniques involved in development, production and evaluation of vaccines. 1 three-hour laboratory. Prereq: MICR 471.

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.

Basic chemical, biochemical and pharmacological principles applied to the study of therapeutic agents; pharmacologic properties of drugs that affect their ADME and therapeutic effects. Prereq: BIOC 460, BIOC 461, CHEM 341, CHEM 342. {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. {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 341, PSCI 411, BIOC 461. {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. {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: BIOC 461, PHRM 341 and PSCI 411. {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 443. Toxicology. 2 Credits.

Poisons, their mode of action, detoxification, and treatment. Prereq: PSCI 412.

PSCI 470. Pharmaceutics III:Pharmacokinetics. 3 Credits.

Concepts and mathematical techniques for describing the time course of drugs in biological systems. {Also offered for graduate credit - see PSCI 670.}.

PSCI 491. Seminar. 1-5 Credits.

PSCI 492. Study Abroad. 1-15 Credits.

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.

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: admission to PharmD program. {Also offered for undergraduate credit - see PSCI 410.}

PSCI 611. Principles of Pharmacokinetics and Pharmacodynamics. 3 Credits.

Basic chemical, biochemical and pharmacological principles applied to the study of therapeutic agents; pharmacologic properties of drugs that affect their ADME and therapeutic effects. {Also offered for undergraduate credit - see PSCI 411.}

PSCI 612. Chemotherapeutic/Infectious Disease Pharmacodynamics. 3 Credits.

Pharmacologic and therapeutic properties of chemotherapeutic agents and anti-infective drugs. {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. {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. {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. {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. Prereq: Admission to PharmD/graduate PSCI program. {Also offered for undergraduate credit - see PSCI 417.}

PSCI 670. Pharmaceutics III:Pharmacokinetics. 3 Credits.

Concepts and mathematical techniques for describing the time course of drugs in biological systems. {Also offered for undergraduate credit - see PSCI 470.}

PSCI 690. Graduate Seminar. 1-3 Credits.

PSCI 696. Special Topics. 1-5 Credits.

PSCI 697. Individual Study. 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 718. Techiques in Pharmaceutical Research. 3 Credits.

Application of modern instrumental techniques in the pharmaceutical sciences; qualitative and quantitative determination of physiologically and pharmacologically important substance.

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 899. Doctoral Dissertation. 1-15 Credits.

Pharmacy Practice (PHRM)

PHRM 101. Introduction to Public Health. 3 Credits.

Introduction 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 health care and other professionals.

PHRM 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. Restricted to pre-CLS, pre-RC, pre-RS, pre-Nursing, pre-Pharmacy and Pharmacy majors only.

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. Study Abroad. 1-15 Credits.

PHRM 294. Individual Study. 1-5 Credits.

PHRM 299. Special Topics. 1-5 Credits.

PHRM 300. Principles of Clinical Pharmacology. 3 Credits.

Principles of pharmacology and therapeutics for nursing and other non-pharmacy health professions. Does not count toward a pharmacy major. Prereq: Non-pharmacy majors only.

PHRM 340. Pathophysiology I. 4 Credits.

Comprehensive study of the normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: BIOL 220, BIOL 220L, BIOL 221, BIOL 221L.

PHRM 341. Pathophysiology II. 4 Credits.

Normal and abnormal physiological processes and the mechanisms important to the understanding of pharmacology and drug therapy. Prereq: PSCI 340.

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. Pharmaceutical Care Laboratory I. 2 Credits.

Through hands on application, students will develop competence in pharmaceutical care, pharmacy calculations, prescription dispensing and consultation, and compounding nonsterile and sterile products. Coreq: PHRM 350 and PHRM 351.

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: PHRM 351, PHRM 351L.

PHRM 355. Introductory Pharmacy Practice Experience I: Introduction to Institutional Pharmacy Practice. 3 Credits.

This course is designed to be an introduction to institutional and health systems pharmacy. This practice experience will allow students to further develop the knowledge and skills learned in the pharmaceutical care series in addition to developing an understanding of the role of a hospital pharmacist as a member of the health care team. Prereq: PHRM 351L, PHRM 352. Pass/Fail grading.

PHRM 379. Study Tour Abroad. 1-6 Credits.

PHRM 391. Seminar. 1-3 Credits.

PHRM 392. Study Abroad. 1-15 Credits.

PHRM 394. Individual Study. 1-5 Credits.

PHRM 397. Fe/Coop Ed/Internship. 1-4 Credits.

PHRM 399. Special Topics. 1-5 Credits.

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. Co-req: PHRM 452L.

PHRM 452L. Pharmaceutical Care Laboratory II. 2 Credits.

Through hands on application, students will develop competence in pharmaceutical care, pharmacy calculations, prescription dispensing and consultation, compounding nonsterile and sterile products, long term care, and self-care. Prereq: PHRM 351 and PHRM 351L. Coreq: PHRM 452.

PHRM 455. Introductory Pharmacy Practice Experience II: Introduction to Community Based Patient Care. 3 Credits.

IPPE II is designed to be an introduction to community based pharmacy practice. This course consists of a 3 week, 120 hour, unpaid, supervised pharmacy practice experience in a community pharmacy setting and required reflections. Prereq: PHRM 452, PHRM 452L. Pass/Fail grading.

PHRM 462. Stress Management for Health Care Professionals. 1 Credit.

This course for health care professionals will focus on healthy coping skills and self-care techniques for stress reduction and relaxation, not only in their professional lives, but also in providing patient care. Prereq: Pharmacy or Nursing major.

PHRM 463. Current Issues in Hospital Pharmacy. 2 Credits.

This course will provide students with a working knowledge of issues and requirements faced by hospital pharmacists and the managerial techniques and practice standards utilized in meeting them. Prereq: P2 student.

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: Admission to professional program.

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 485. Economic Outcomes Assessment and Relevant Issues. 2 Credits.

The use of pharmaco-economic analysis and outcomes assessment as applied to health care. Prereq: PHRM 480 or Doctor of Nursing or MBA standing.

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 520. Special Populations. 3 Credits.

Focused on providing pharmaceutical care for a variety of populations including men, women, pediatric and geriatric patients. Prereq: Bachelor of Science in Pharmaceutical Sciences.

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: PSCI 412, BS in Pharmaceutical Sciences. {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 and PSCI 415.

PHRM 535. PTDI:Neoplastic Diseases. 3 Credits.

In-depth study of the pathophysiology, pharmacotherapy and diagnostic evaluation of major neoplastic diseases. Prereq: BS in Pharmaceutical Sciences.

PHRM 536. Neurology & Psychiatry. 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 and BS in Pharmaceutical Sciences.{Also offered for graduate credit - see PHRM 636.}

PHRM 537. Renal Disease/Fluid and Electrolytes. 3 Credits.

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: BS in Pharmaceutical Sciences.

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: BS in Pharmaceutical Sciences.

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 551L. Pharmaceutical Care Laboratory III. 2 Credits.

This course focuses on pharmaceutical care, pharmacy calculations, prescription consultation, compounding nonsterile and sterile products, and disease state management. Students will use a team-based approach to solve medication and practice related problems. Prereq: PHRM 452 and PHRM 452L. Coreq: PHRM 551.

PHRM 552L. Pharmaceutical Care Laboratory IV/Introductory Pharmacy Practice Experience 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 551, PHRM 551L. Coreq: PHRM 552.

PHRM 555. Introductory Pharmacy Practice Experience III. 1 Credit.

Introduction to patient care opportunities focused on population and public health opportunities for pharmacists. This course consists of 40 hours of supervised pharmacy practice experiences and required reflections. Prereq: PHRM 452L Coreq or Prereq: PHRM 551L.

PHRM 560. Specialty Care Topics. 2 Credits.

Immunology, vaccine-preventable diseases, indications for vaccination, and implementation and maintenance of a pharmacy-based vaccination program in addition to the pharmacist's role in home health, palliative/hospice care, peri-operative/surgical/critical care, anemia, and nutrition support. Prereq: BS in Pharmaceutical Sciences.

PHRM 570. Pharmacy Practice Improvement and Project Management. 3 Credits.

Students will gain a basic understanding of evidence-based medicine (EBM) and practice improvement/evaluation review techniques (PERT) in health care. Prereq: PHRM 475 and PHRM 480.

PHRM 572. Pharmacy Law. 2 Credits.

Pharmaceutical jurisprudence, including state and federal laws and regulations concerned with the practice of pharmacy.

PHRM 575. Pharmacy Management. 3 Credits.

Case studies of retail and hospital pharmacy management concerns, as well as the unique consideration of retail pharmacy and institutional factors of hospital pharmacy management.

PHRM 580. Pharmacotherapy Capstone. 3 Credits.

Students will evaluate integrated patient case scenarios using clinical practice guidelines, current scientific literature, and pharmacotherapy concepts. Prereqs: PHRM 532, PHRM 534, PHRM 535, PHRM 536, PHRM 537 and PHRM 538.

PHRM 581. Advanced Pharmacy Practice Experience I. 10 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.

PHRM 582. Advanced Pharmacy Practice Experience II. 15 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.

PHRM 583. Advanced Pharmacy Practice Experience III. 15 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.

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.

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. {Also offered for professional credit - see PHRM 532.}.

PHRM 636. Neurology and Psychiatry. 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. {Also offered for professional credit - see PHRM 536.}

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 675. Pharmacy Management. 3 Credits.

Case studies of retail and hospital pharmacy management concerns, as well as the unique consideration of retail pharmacy and institutional factors of hospital pharmacy management.

PHRM 685. Economic Outcomes Assessment/Relevant Issues. 2 Credits.

The use of pharmacoeconomic analysis and outcomes assessment as applied to health care. Prereq: PHRM 480 or Doctor of Nursing or MBA standing.

PHRM 696. Special Topics. 1-5 Credits.

PHRM 710. Health Care Systems. 3 Credits.

In this course, students will be introduced to health professions, health care systems, financing, health promotion, and behavioral issues. Prereq: MPH students only.

PHRM 716. Social and Administrative Sciences Research. 3 Credits.

The premise of this course is to provide the student with a basic understanding of how to conduct academic and professional research in the pharmaceutical social and administrative sciences (PS&AS). Prereq: PHRM 715 and STAT 725.

PHRM 795. Fe/Coop Ed/Internship. 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 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 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. Study Abroad. 1-15 Credits.

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 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. Study Tour Abroad. 1-6 Credits.**PHIL 391. Seminar. 1-3 Credits.****PHIL 392. Study Abroad. 1-15 Credits.****PHIL 394. Individual Study. 1-5 Credits.****PHIL 399. Special Topics. 1-5 Credits.****PHIL 425. Environmental Ethics. 3 Credits.**

An investigation of ethics and the environment, including but not limited to ecofeminism, economics as environmental policy, and deep ecology. Prereq: PHIL 210 or PHIL 215 or PHIL 216. {Also offered for graduate credit - see PHIL 625.}.

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 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. Study Abroad. 1-15 Credits.****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 110. Introductory Astronomy. 3 Credits.

Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulas, galaxies.

PHYS 110L. Introductory Astronomy Lab. 1 Credit.

Qualitative survey of the current understanding of the universe including planetary explorations, solar phenomena, stars, black holes, nebulas, galaxies.

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 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 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 220. Physics for Designers. 3 Credits.

Application of physics concepts and principles for designers such as architects, interior designers, and engineers using focused problem-solving in work-groups. Topics selected from mechanics, sound, thermodynamics, optics, electricity, magnetism, and modern physics. Prereq: MATH 105 or ARCH 233 or equivalent.

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 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 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 252R. University Physics II Recitation. 1 Credit.

A recitation that complements PHYS 252 with emphasis on theory and applications. Coreq: PHYS 252.

PHYS 291. Seminar. 1-3 Credits.**PHYS 292. Study Abroad. 1-15 Credits.****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 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. Study Tour Abroad. 1-6 Credits.**PHYS 391. Seminar. 1-3 Credits.****PHYS 392. Study Abroad. 1-15 Credits.****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. {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. {Also offered for graduate credit - see PHYS 615.}.

PHYS 455. Classical Mechanics. 3 Credits.

Lagrangian dynamics, central force, rigid body motion, small oscillations, Hamiltonian dynamics, canonical transformations, dynamics of continuous systems. Prereq: PHYS 251 and MATH 265. Co-req: MATH 266. {Also offered for graduate credit - see PHYS 655.}.

PHYS 462. Heat & Thermodynamics. 3 Credits.

Classical principles and laws of thermodynamics. Cyclic processes and entropy functions. Legendre differential transformations. Maxwell relations, stability and phase transitions, critical phenomena. Prereq: PHYS 252. {Also offered for graduate credit - see PHYS 662.}.

PHYS 463. Statistical Mechanics. 3 Credits.

The Maxwell-Boltzmann distribution function and its applications to thermodynamic problems. Introduction to kinetic theory. Introduction to Bose-Einstein and Fermi-Dirac statistics. Prereq: PHYS 462. {Also offered for graduate credit - see PHYS 663.}.

PHYS 481. Introduction to 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 485. {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 489. Physics Projects. 3 Credits.

Capstone experience in physics.

PHYS 491. Seminar. 1-5 Credits.**PHYS 492. Study Abroad. 1-15 Credits.****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. {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. {Also offered for undergraduate credit - see PHYS 415.}.

PHYS 655. Classical Mechanics. 3 Credits.

Lagrangian dynamics, central force, rigid body motion, small oscillations, Hamiltonian dynamics, canonical transformations, dynamics of continuous systems. {Also offered for undergraduate credit - see PHYS 455.}.

PHYS 662. Heat & Thermodynamics. 3 Credits.

Classical principles and laws of thermodynamics. Cyclic processes and entropy functions. Legendre differential transformations. Maxwell relations, stability and phase transitions, critical phenomena. {Also offered for undergraduate credit - see PHYS 462.}.

PHYS 663. Statistical Mechanics. 3 Credits.

The Maxwell-Boltzmann distribution function and its applications to thermodynamic problems. Introduction to kinetic theory. Introduction to Bose-Einstein and Fermi-Dirac statistics. {Also offered for undergraduate credit - see PHYS 463.}.

PHYS 681. Introduction to 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. {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, resonance mechanisms.

PHYS 772. Quantum Physics II. 3 Credits.

Schrodinger equation, wave packets, uncertainty, angular momentum, spin, second quantization, harmonic oscillator, resonance 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. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.**PPTH 391. Seminar. 1-5 Credits.****PPTH 392. Study Abroad. 1-15 Credits.****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. Study Abroad. 1-15 Credits.

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, symptomology, 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. 2 Credits.

The course will provide an understanding of fungicides, their mode of action, the development of resistance, and resistance management strategies.

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 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. S.

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. S.

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 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. S.

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. Study Abroad. 1-15 Credits.****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, BOT 315, and ZOO 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, BOT 315L, and ZOO 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 360. Horticultural Food Crops. 4 Credits.

History, classification, culture, physiological principles, post harvest handling, and marketing of major fruit and vegetable crops. 4 lectures. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 210. S (odd years).

PLSC 362. Potato Science. 2 Credits.

History, botany, cultural practices, harvesting, breeding, physiology, storage, and processing of the potato. 2 lectures. Recommended Coreq: BIOL 150 or BIOL 151, PLSC 110 or PLSC 210. F/2 (odd years).

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 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. F.

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. F.

PLSC 379. Study Tour Abroad. 1-6 Credits.**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 391. Seminar. 1-5 Credits.**PLSC 392. Study Abroad. 1-15 Credits.****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 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 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. Cross-listed with BOT 431 and ZOO 431. 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: BOT 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: BOT 380. S {Also offered for graduate credit - see PLSC 686.}

PLSC 491. Seminar. 1-5 Credits.**PLSC 492. Study Abroad. 1-15 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 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. Cross-listed with BOT 631 and ZOO 631. 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. Cross-listed with BIOC 721. 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. 4 Credits.

Chromosome behavior during mitosis and meiosis; chromosome structure, function, and recombination; inheritance in aneuploids and polyploids; haploid formation and utilization. 3 lectures, 1 three-hour laboratory. F (even years).

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: Bioenergy Crops - The European View. 3 Credits.

This is a study abroad course which will cover the main aspects of biomass crop production and processing trends for conversion of lignocellulosic feedstocks into second and third generation biofuels in Europe. SS.

PLSC 780. Population Genetics. 2 Credits.

Concepts and principles related to genetic properties governing random and non-random mating populations. 2 lectures. F (odd years).

PLSC 781. Quantitative Genetics. 2 Credits.

Applied quantitative genetics and implications on plant breeding. 2 lectures. Prereq: PLSC 718, PLSC 724, PLSC 780. Recommended Prereq: PLSC 711, PLSC 734. S (even years).

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 793. Indiv 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 240. Political Ideologies. 3 Credits.

Study of ideas, belief systems, and basic principles of ideologies.

POLS 291. Seminar. 1-5 Credits.

POLS 292. Study Abroad. 1-15 Credits.

POLS 294. Individual Study. 1-5 Credits.

POLS 299. Special Topics. 1-5 Credits.

POLS 325. Applied Research Methods. 4 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, laboratory. Co-req or Prereq: STAT 330. Cross-listed with COMM 325 and 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. Prereq: admission to the Political Science professional program.

POLS 351. Women and Politics. 3 Credits.

Study of women leaders; their roles and perspectives within a national and international framework. Prereq: admission to the Political Science professional program.

POLS 360. Principles of Public Administration. 3 Credits.

Empirical study of public administrators in their diverse roles and functions. Prereq: admission to the Political Science professional program.

POLS 379. Study Tour Abroad. 1-6 Credits.

POLS 391. Seminar. 1-5 Credits.

POLS 392. Study Abroad. 1-15 Credits.

POLS 394. Individual Study. 1-5 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. Prereq: admission to the Political Science professional program. {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 and admission to the Political Science professional program. {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. Prereq: admission to the Criminal Justice or Political Science professional program. {Also offered for graduate credit - see POLS 631.}.

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. Prereq: admission to the Political Science professional program. {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 and admission to the Political Science professional program. {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. Prereq: admission to the Political Science professional program. {Also offered for graduate credit - see POLS 645.}.

POLS 446. Current Topics in International Law. 3 Credits.

Examines a special topic within the field of international law. Some examples include: the use of force, international criminal law, and the intersection of international law and U.S. domestic law. Prereq: POLS 220 or POLS 225 and students who have been admitted to the Political Science professional program only.

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. Prereq: admission to the Political Science professional program. {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. Prereq: admission to the Political Science professional program. {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. Prereq: admission to the Political Science professional program. {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. Prereq: admission to the Political Science professional program. {Also offered for graduate credit - see POLS 653.}.

POLS 489. Senior Seminar. 3 Credits.

Capstone experience. Emphasis on integrative skills needed to interrelate the concepts of the discipline. Prereq: admission to the Political Science professional program.

POLS 491. Seminar. 1-5 Credits.

POLS 491H. Seminar. 1-3 Credits.

POLS 492. Study Abroad. 1-15 Credits.

POLS 494. Individual Study. 1-5 Credits.

POLS 496. Field Experience. 1-15 Credits.

POLS 499. Special Topics. 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 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 797. Master's Paper. 1-3 Credits.

Psychology (PSYC)

PSYC 111. Introduction to Psychology. 3 Credits.

Survey of the scientific study of behavior and mental processes.

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. Study Abroad. 1-15 Credits.****PSYC 294. Individual Study. 1-5 Credits.****PSYC 299. Special Topics. 1-5 Credits.****PSYC 322. Thinking & Making Decisions. 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.

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 360. Animal Behavior. 3 Credits.

See Biological Sciences (Zoology) for description.

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. Study Tour Abroad. 1-6 Credits.

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. Study Abroad. 1-15 Credits.

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 theoretical bases of the individual (motivation, satisfaction) and social (leadership, work group) factors involved in work behavior. Coreq: PSYC 351. {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 social and cognitive development. Topics include attachment, adolescent risk-taking, theories of intelligence, and meta-cognition. Laboratory experiences illustrate 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. 2 Credits.

Capstone experience option.

PSYC 491. Seminar. 1-5 Credits.**PSYC 492. Study Abroad. 1-15 Credits.****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 theoretical bases of the individual (motivation, satisfaction) and social (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 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 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 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 336.

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 326. Modeling of Range and Agro-Ecosystems. 3 Credits.

Introduction and applications of systems analysis and simulation modeling to agriculture, biology, range ecology, and natural resources management. 2 lectures, 1 two-hour laboratory. (even years).

RNG 336. Introduction to Range Management. 3 Credits.

Principles of range management which include plant identification, range evaluation, and range improvement. 3 lectures. F.

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. Prereq: BOT 314. Cross-listed with BOT 450. F {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 336, BOT 460 or RNG 460. {Also available for graduate credit - see RNG 651.}.

RNG 452. Geographic Information Systems in Range Survey. 3 Credits.

Analysis of methods for determining range composition, condition, and productivity. Emphasis will be given to the use of Geographic Information Systems. 3 lectures. Prereq: RNG 336. F (odd years) {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 336 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. Range Habitat Management. 3 Credits.

Study of specific techniques and systems approaches to maintenance and improvement of rangeland ecosystems. 3 lectures. Prereq: RNG 336. S (odd years) {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 336. S (even years) {Also offered for graduate credit - see RNG 658.}.

RNG 460. 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 151, BIOL 151L. Cross-listed with BOT 460. {Also offered for graduate credit - see RNG 660.}.

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. Study Abroad. 1-15 Credits.****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. Cross-listed with BOT 650. F {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. Geographic Information Systems in Range Survey. 3 Credits.

Analysis of methods for determining range composition, condition, and productivity. Emphasis will be given to the use of Geographic Information Systems. 3 lectures. F (odd years) {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. Range Habitat Management. 3 Credits.

Study of specific techniques and systems approaches to maintenance and improvement of rangeland ecosystems. 3 lectures. S (odd years) {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. S (even years) {Also offered for undergraduate credit - see RNG 458.}.

RNG 660. 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. Cross-listed with BOT 660. {Also offered for undergraduate credit - see RNG 460.}.

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. Cross-listed with BOT 716. 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. Cross-listed with BOT 717. F (odd years).

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 899. Doctoral Dissertation. 1-15 Credits.

Religious Studies (RELS)

RELS 100. Introduction to Religion. 3 Credits.

Introduction to the ways religious concerns are expressed, to religious values as a basis for human action, and to a spectrum of ethical styles.

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.

Overview of the developments in the primitive Christian community as reflected in the New Testament.

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. Study Abroad. 1-15 Credits.

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 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.

RELS 379. Study Tour Abroad. 1-6 Credits.

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 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 491. Seminar. 1-5 Credits.

RELS 492. Study Abroad. 1-15 Credits.

RELS 494. Individual Study. 1-5 Credits.

RELS 496. Field Experience. 1-15 Credits.

RELS 499. Special Topics. 1-5 Credits.

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. Study Abroad. 1-15 Credits.

RC 294. Individual Study. 1-5 Credits.

RC 299. Special Topics. 1-5 Credits.

RC 379. Study Tour Abroad. 1-6 Credits.

RC 391. Seminar. 1-5 Credits.

RC 392. Study Abroad. 1-15 Credits.

RC 394. Individual Study. 1-5 Credits.

RC 399. Special Topics. 1-5 Credits.

RC 491. Seminar. 1-5 Credits.

RC 492. Study Abroad. 1-15 Credits.

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 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 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. Prereq: SOC 110.

SOC 291. Seminar. 1-5 Credits.

SOC 292. Study Abroad. 1-15 Credits.

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. Study Tour Abroad. 1-6 Credits.

SOC 391. Seminar. 1-3 Credits.

SOC 392. Study Abroad. 1-15 Credits.

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. Prereq: SOC 110. {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 427. Public Health Law and Policy for Non-urban, Rural and Frontier Areas. 3 Credits.

This course explores the ways that laws and policies impact rural public health and medical care in the US, the impact of potential policies on public health, and the courts' role and interpretations of public health law.

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 443. International Disasters. 3 Credits.

Impacts of natural and human-made disasters on industrialized and developing societies; relief and reconstruction post-disaster programs. {Also offered for graduate credit - see SOC 643.}

SOC 445. Special Populations in Disasters. 3 Credits.

Identification of special populations and their needs that arise in emergency or disaster situations both in industrialized and developing countries. {Also offered for graduate credit - see SOC 645.}

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 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. Study Abroad. 1-15 Credits.****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 643. International Disasters. 3 Credits.

Impacts of natural and human-made disasters on industrialized and developing societies; relief and reconstruction post-disaster programs. {Also offered for undergraduate credit - see SOC 443.}.

SOC 645. Special Populations in Disasters. 3 Credits.

Identification of special populations and their needs that arise in emergency or disaster situations both in industrialized and developing countries. {Also offered for undergraduate credit - see SOC 445.}.

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 690. Graduate Seminar. 1-3 Credits.**SOC 692. Study Abroad. 1-15 Credits.****SOC 693. Individual Study/Tutorial. 1-5 Credits.****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 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.**

Physical, chemical and biological properties of soils, as related to use, conservation and plant growth. 2 lectures, 1 laboratory. F,S.

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. Prereq: MATH 103. 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. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.**SOIL 391. Seminar. 1-5 Credits.****SOIL 392. Study Abroad. 1-15 Credits.****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 Physics. 3 Credits.

Soil as a three-phase system. Application to soil of physical principles and measurements of soil properties, including density, texture, structure, water content, heat capacity, and transport coefficients. Relationship of properties to agricultural and industrial contamination. 2 lectures, 1 laboratory. Prereq: SOIL 210, PHYS 211, MATH 146. F {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 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 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 480. Soils and Pollution. 3 Credits.

To provide the basic physical, chemical, and biological fate and transport processes of pollution in soils and to neighboring water bodies. Also, how to model and apply these processes to the landscape scale. Prereq: MATH 146, CHEM 121, CHEM 121L. {Also offered for graduate credit - see SOIL 680.}

SOIL 491. Seminar. 1-5 Credits.**SOIL 492. Study Abroad. 1-15 Credits.****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 Physics. 3 Credits.

Soil as a three-phase system. Application to soil of physical principles and measurements of soil properties, including density, texture, structure, water content, heat capacity, and transport coefficients. Relationship of properties to agricultural and industrial contamination. 2 lectures, 1 laboratory. F {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 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 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 680. Soils and Pollution. 3 Credits.

To provide the basic physical, chemical, and biological fate and transport processes of pollution in soils and to neighboring water bodies. Also, how to model and apply these processes to the landscape scale. {Also offered for undergraduate credit - see SOIL 480.}.

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. Modeling Environmental Fate and Transport. 2 Credits.

To provide the principles of modeling physical, chemical, and biological fate and transport processes for application in current environmental problems. Emphasis placed on mathematically expressing processes and describing observations. 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 Physics. 3 Credits.

Composition of soil in terms of solid, liquid, and gaseous phases. Theory of water, heat, and solute transport processes. Water availability for plant growth. 2 lectures, 1 laboratory. Prereq: SOIL 633. (even years).

SOIL 782. Advanced Soil Fertility. 2 Credits.

Advanced study of soil-plant-nutrient relationships with emphasis on concepts of soil fertility, ion absorption, nutrient transformation, and interpretation of experimental data. 2 lectures. F (even years).

SOIL 784. Advanced Soil Genesis, Morphology and Classification. 2 Credits.

Advanced study of processes of soil development, soil morphology, and principles of soil classification. 2 lectures. Prereq: SOIL 644. F (even years).

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 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 291. Seminar. 1-5 Credits.

SPAN 292. Study Abroad. 1-15 Credits.

SPAN 294. Individual Study. 1-5 Credits.

SPAN 299. Special Topics. 1-5 Credits.

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. Study Tour Abroad. 1-6 Credits.

SPAN 391. Seminar. 1-5 Credits.

SPAN 392. Study Abroad. 1-15 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 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. Study Abroad. 1-15 Credits.****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.}.

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. Study Abroad. 1-15 Credits.****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.

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. Study Tour Abroad. 1-6 Credits.**STAT 391. Seminar. 1-5 Credits.****STAT 392. Study Abroad. 1-15 Credits.****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: 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. Prereq: STAT 330 or STAT 368. {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. {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 II. 1 Credit.

Selected material from probability and mathematical statistics in preparation for the national actuarial exam. Prereq: STAT 368 or STAT 468.

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, indented 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. Study Abroad. 1-15 Credits.****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. {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. {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. {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 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 677. {Also offered for undergraduate credit - see STAT 478.}.

STAT 690. Graduate Seminar. 1-3 Credits.**STAT 696. Special Topics. 1-5 Credits.****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 762. Messy Data Analysis. 3 Credits.

One-way classification models with heterogeneous errors. Two-way classification analysis in the unbalanced case. Analysis of mixed models. Split-plot, nested, and crossover designs. Prereq: STAT 662.

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.

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. Linear Models I. 3 Credits.

General linear models. Full rank models. Estimation, confidence ellipsoids, and tests of hypotheses. Not full rank models. Applications to regression and design of experiments. 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.

Further discussion of properties of estimators, theory of estimation, and hypotheses testing. 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 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 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 205. Backstage Practicum. 1 Credit.

Participation in various activities connected with the Little Country Theatre Productions. Requires crew assignment on a production. May be repeated for credit.

THEA 206. Performance & Management Practicum. 1 Credit.

Participation in various activities connected with the Little Country Theatre Productions. Requires cast or management assignment on a production. May be repeated for credit.

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 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 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 261. Acting II. 3 Credits.

Practical application of fundamental skills to textual work. Prereq: THEA 161.

THEA 262. Introduction to Dance. 2 Credits.

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. 2 Credits.

Introduction to the basic concepts and principles of ballet, modern, jazz, ballroom, swing, 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 276. Lighting and Sound Design for the Theatre. 3 Credits.

An introduction to the art of theatrical lighting and sound design.

THEA 277. 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 278. 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 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. Study Abroad. 1-15 Credits.****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 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. 1 Credit.

Integration of beginning dance techniques in the standard theatre dance repertoire through studio experiences. Prereq: THEA 262.

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 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 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 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. Study Tour Abroad. 1-6 Credits.**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. Study Abroad. 1-15 Credits.

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 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 468. Acting the Song II. 3 Credits.

Advanced study/application of the integration of acting and singing techniques. Restricted to Theatre and Music majors only. Prereq: MUSC 167 (2 semesters), MUSC 267 (2 semesters), THEA 161, THEA 268, and either THEA 262 or THEA 263.

THEA 480. History and Literature of Theatre I. 3 Credits.

Historical study of theatre architecture, staging methods, individual artists and plays from the theatre's origins through the 17th century. Prereq: THEA 180 and THEA 181.

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 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. Study Abroad. 1-15 Credits.

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 711. Logistics Systems. 4 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. Enterprise Resource Planning. 3 Credits.

This course introduces students to Enterprise Resource Planning (ERP) and its implementation. Topics covered from the perspective of ERP include: process integration, value chain management, international implementations, organizational 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. International Logistics Management. 4 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 723. Advanced Supply-Chain Planning Across the Enterprise. 3 Credits.

Builds on theories and tools developed in TL 711. By understanding both current capabilities and evolving needs of an organization, the appropriate modifications to the organization's supply chain can be identified. Prereq: TL 711.

TL 725. Technology Advances and Logistics. 3 Credits.

This course addresses the new technologies that help shape advanced logistics and the advantages that such technologies have brought to end users, suppliers, and a broad spectrum of related industries. Prereq: TL 711.

TL 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.

TL 729. Adaptive Planning in Logistics Systems. 3 Credits.

Presents a systems view with a focus on how remote sensing technology enables sense and respond logistics. Topics include organizational structure, strategic alliances, programmed decision making, supply-chain dynamics, and the value of information transparency. Prereq: TL 711.

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 Logistics. 3 Credits.

This course will focus on actual logistics 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. Prereq: TL 721, TL 723, TL 725, TL 729. S/U grading.

TL 735. Acquisition Contracts: Law and Management. 3 Credits.

Study of the legal framework in the contracting process with emphasis on the law and legal processes of acquisition contracts.

TL 751. Transportation Systems Security. 3 Credits.

This course examines security threats and solutions related to transportation systems. Specific focus is placed securing passenger and freight modes of transportation including railroad, highway, aviation, maritime and pipelines from acts of terrorism and intentional disruption.

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 753. Transportation System Modeling. 3 Credits.

This course focuses on quantitative techniques used for planning and operation of transportation systems. Topics include: system capacities and flows, comprehensive models of transportation and urban systems, and understanding how political processes, new technologies, and economic considerations affect transportation decisions.

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. 2 Credits.

Context Sensitive Solutions (CSS) examine, in addition to traditional transportation engineering factors, impacts on the community as well as the natural and human environment. This course will introduce students to the main principles of CSS and allow them to learn how they are applied through use of case studies.

TL 756. Transportation Systems Laboratory. 3 Credits.

This course applies urban transportation, traffic engineering, and data collection methods to real-world case studies in small urban areas. Students will work with a community to conduct a comprehensive urban transportation study, including data collection, assessment of current conditions, evaluation, alternative solutions, and presenting the findings.

TL 782. Transportation Systems I. 3 Credits.

This course provides an overview of transportation systems, including relationships among transportation, the economy, environment, and land use. The focus is on highway and freight transportation (including demand, capacity, cost, service, and investment analysis) with applications to multimodal corridor planning.

TL 783. Transportation Systems II. 3 Credits.

This course focuses on railroads and freight multimodal planning. It includes an introduction to railroads, an overview of the railroad industry and services, cost models, regulations, energy requirements, route analysis, operations, line capacities, intermodal terminals, environmental considerations, and multimodal freight issues. Prereq: TL 782.

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.

This course 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. Industry experts will provide guest lectures. Prereq: TL 782.

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 788. 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 789. Leadership, Ethics, and Academic Conduct in Transportation. 3 Credits.

This course focuses on academic conduct in students' educational programs, and then goes on to explore theories, concepts, and practices of leadership and ethics that students may apply to their academic programs and transportation careers.

TL 790. Graduate Seminar. 1-5 Credits.**TL 791. Temporary/Trial Topics. 1-5 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 823. Contemporary Supply Chain Research. 3 Credits.

This course focuses on contemporary research in supply chain management. Topics include advertising, information technology, game theory, supply chain contracts, and sustainability. The ability to perform and present supply chain research is cultivated. Prereq: TL 811.

TL 829. Supply Chain Risk Management. 3 Credits.

This course focuses on risk management in supply chains. Topics include random yields, exchange rates, real options, complex systems, and disruptions. The ability to perform and present supply chain risk management research is cultivated. Prereq: TL 811.

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 885. Geospatial Information Systems for Transportation. 3 Credits.

This course focuses on spatial analysis in transportation using Geographic Information Systems to build research framework and solve problems in transportation and logistics. The emphasis is on data modeling and the cutting-edge theories. Prereq: GEOG 655 or TL 785.

TL 899. Doctoral Dissertation. 1-15 Credits.

University, General (UNIV)

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. Repeated course opportunity exists for failing grades only. Cross-listed with ABEN 189, AGRI 189, BUSN 189, HD&E 189, ME 189, NURS 189 and PHRM 189. F, S.

UNIV 194. Individual Study. 1-5 Credits.**UNIV 196. Field Experience. 1-15 Credits.****UNIV 199. Special Topics. 1-5 Credits.****UNIV 291. Seminar. 1-5 Credits.****UNIV 292. Study Abroad. 1-15 Credits.****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. Study Tour Abroad. 1-6 Credits.****UNIV 391. Seminar. 1-5 Credits.****UNIV 392. Study Abroad. 1-15 Credits.****UNIV 394. Individual Study. 1-5 Credits.****UNIV 397. Fe/Coop Ed/Internship. 1-15 Credits.****UNIV 399. Special Topics. 1-5 Credits.****UNIV 489. Capstone Experience. 3 Credits.**

This course includes: creating a job packet, an annotated bibliography, and a reflective paper, designed to help the student integrate, synthesize, and communicate the cumulative academic experience relating to the approved Statement of Goals. F,S.

UNIV 491. Seminar. 1-5 Credits.**UNIV 491H. Seminar. 1-3 Credits.****UNIV 492. Study Abroad. 1-15 Credits.****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 695. Fe/Coop Ed/Internship. 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. Fe/Coop Ed/Internship. 1-15 Credits.**

Veterinary Science (VETS)

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 130. Companion Animal Breeds. 1 Credit.

History, development, uses, characteristics, and genetic predispositions of dogs, cats, horses, goats, birds, and laboratory animals. General terms associated with each species, and pertinent color patterns.

VETS 135. Anatomy and Physiology of Domestic Animals. 3 Credits.

Introduction to the anatomy and physiology of common domestic mammals. Emphasis on how the body's normal structures and functions contribute to health.

VETS 136. Anatomy and Physiology Laboratory. 1 Credit.

To accompany VETS 135.

VETS 150. Introduction to the Veterinary Profession. 1 Credit.

Exploration of the many educational and career opportunities in veterinary medicine available to both veterinarians and veterinary technicians.

VETS 194. Individual Study. 1-5 Credits.

VETS 196. Field Experience. 1-15 Credits.

VETS 199. Special Topics. 1-5 Credits.

VETS 255. Fundamentals of Veterinary Radiography. 2 Credits.

Diagnostic radiograph production including X-ray machine operation, dark room procedures, radiographic positioning, and radiation safety. Prereq: VETS 125, VETS 135, VETS 136 and VETS 256 and acceptance into the professional Veterinary Technology program. Co-req: VETS 255L.

VETS 255L. Fundamentals of Veterinary Radiography 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: VETS 125, VETS 135, VETS 136 and VETS 256 and acceptance into the professional portion of the Veterinary Technology program. Co-req: VETS 255.

VETS 256. Veterinary Clinical Techniques and Instruments. 4 Credits.

Clinical procedures and instrumentation used in the day-to-day operation of a veterinary practice.

VETS 259. Small Animal Diseases. 2 Credits.

Basic principles of common dog and cat diseases with emphasis on client education.

VETS 291. Seminar. 1-5 Credits.

VETS 292. Study Abroad. 1-15 Credits.

VETS 294. Individual Study. 1-5 Credits.

VETS 299. Special Topics. 1-5 Credits.

VETS 357. Veterinary Pharmacology. 3 Credits.

Study of drugs used in veterinary medicine with particular emphasis on commonly used drug groups.

VETS 358. Veterinary Surgical Nursing Techniques. 4 Credits.

Preparation for and assistance with veterinary surgical procedures. Provision of proper aftercare for veterinary surgical patients.

VETS 359. Veterinary Hospital Information and Procedures. 2 Credits.

Principles of veterinary hospital management and client relations/education.

VETS 379. Study Tour Abroad. 1-6 Credits.

VETS 385. Veterinary Clinical Pathology I. 3 Credits.

Study of parasitology principles and procedures commonly utilized in veterinary medicine.

VETS 386. Veterinary Clinical Pathology II. 3 Credits.

Study of hematology principles and procedures commonly utilized in veterinary medicine.

VETS 387. Veterinary Clinical Pathology III. 3 Credits.

Study of urine analysis and serum chemistry principles and procedures commonly utilized in veterinary medicine.

VETS 391. Seminar. 1-5 Credits.

VETS 392. Study Abroad. 1-15 Credits.

VETS 394. Individual Study. 1-5 Credits.

VETS 399. Special Topics. 1-5 Credits.

VETS 440. Zoonoses. 3 Credits.

Characteristics of diseases transmissible between animals and humans. Prereq: MICR 202 or MICR 350.

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.

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 1-3. 1-3 Credits.

Supervised experience applying veterinary diagnostic and therapeutic techniques and procedures in a clinical setting. May be repeated with instructor approval.

VETS 485. Veterinary Technology Externship 6-12. 6-12 Credits.

Capstone experience for veterinary technology students. Continued development of skills through supervised work in a veterinary practice or other appropriate clinical setting. Refer to Animal Sciences for information regarding Veterinary Technology program.

VETS 491. Seminar. 1-5 Credits.**VETS 492. Study Abroad. 1-15 Credits.****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 394. Individual Study. 1-5 Credits.**WGS 399. Special Topics. 1-5 Credits.****WGS 450. Issues in Women and Gender Studies. 3 Credits.**

This course will focus on a variety of areas of interest related to women and gender. May be repeated for credit with change in topic. Recommended prereq: WGS 110.

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 790. Graduate Seminar. 1-5 Credits.**

Zoology (ZOO)

ZOO 126. Human Biology. 3 Credits.

Consideration of selected problems in human biology. Cross-listed with BIOL 126. Does not count toward major or minor.

ZOO 126L. Human Biology Laboratory. 1 Credit.

See Biological Sciences (Biology) for description. Does not count toward major or minor.

ZOO 194. Individual Study. 1-5 Credits.

ZOO 196. Field Experience. 1-15 Credits.

ZOO 199. Special Topics. 1-5 Credits.

ZOO 280. Comparative Chordate Morphology. 4 Credits.

Introduction to the systematics, history, and structure of chordates, especially the vertebrates. Prereq: BIOL 151, BIOL 151L. S.

ZOO 291. Seminar. 1-5 Credits.

ZOO 292. Study Abroad. 1-15 Credits.

ZOO 293. Undergraduate Research. 1-5 Credits.

ZOO 294. Individual Study. 1-5 Credits.

ZOO 296. Field Experience. 1-15 Credits.

ZOO 299. Special Topics. 1-5 Credits.

ZOO 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, BOT 315, and PLSC 315. F, S.

ZOO 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, BOT 315L, and PLSC 315L. F, S.

ZOO 360. 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. Cross-listed with PSYC 360. S (even years).

ZOO 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 or BIOL 151. Cross-listed with BIOL 364.

ZOO 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, BIOL 150L.

ZOO 379. Study Tour Abroad. 1-6 Credits.

ZOO 380. Vertebrate Histology. 3 Credits.

Study of the microscopic anatomy of vertebrate tissues and organs, especially mammals. Prereq: BIOL 150, BIOL 150L. S (odd years).

ZOO 391. Seminar. 1-3 Credits.

ZOO 392. Study Abroad. 1-15 Credits.

ZOO 393. Undergraduate Research. 1-5 Credits.

ZOO 394. Individual Study. 1-5 Credits.

ZOO 396. Field Experience. 1-15 Credits.

ZOO 397. Fe/Coop Ed/Internship. 1-4 Credits.

ZOO 399. Special Topics. 1-5 Credits.

ZOO 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. Cross-listed with BOT 431 and PLSC 431. F {Also offered for graduate credit - see ZOO 631.}

ZOO 450. Invertebrate Zoology. 4 Credits.

Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. Prereq: BIOL 151, BIOL 151L. S {Also offered for graduate credit - see ZOO 650.}

ZOO 452. Ichthyology. 3 Credits.

Biology and taxonomy of fishes. Prereq: BIOL 151, 151L. F (even years) {Also offered for graduate credit - see ZOO 652.}

ZOO 454. Herpetology. 3 Credits.

Primarily a field and laboratory course focusing on amphibians and reptiles. Students must make a commitment to participate in at least one of two 4-day field trips plus an independent review project. Prereq: BIOL 151, BIOL 151L. F/2 (odd years) {Also offered for graduate credit - see ZOO 654.}

ZOO 456. Ornithology. 3 Credits.

Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. Prereq: BIOL 151, BIOL 151L. F {Also offered for graduate credit - see ZOO 656.}.

ZOO 458. Mammalogy. 3 Credits.

Biology and taxonomy of mammals. Prereq: BIOL 151, BIOL 151L. F {Also offered for graduate credit - see ZOO 658.}.

ZOO 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, CHEM 121, CHEM 122. {Also offered for graduate credit - see ZOO 660.}.

ZOO 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 151, BIOL 151L. S {Also offered for graduate credit - see ZOO 662.}.

ZOO 463. Physiology of Reproduction. 3 Credits.

Comparative anatomy, physiology, and endocrinology of reproduction in mammals. Cross-listed with ANSC 463. {Also offered for graduate credit - see ZOO 663.}.

ZOO 463L. Physiology of Reproduction Laboratory. 1 Credit.

Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. Cross-listed with ANSC 463L. Prereq: ANSC 463. {Also offered for graduate credit - see ZOO 663L.}.

ZOO 464. Endocrinology. 3 Credits.

Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. Prereq: BIOL 151, BIOL 151L. F/2 (odd years) {Also offered for graduate credit - see ZOO 664.}.

ZOO 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 ZOO 665.}.

ZOO 470. Limnology. 4 Credits.

Biological, physical, and chemical features of freshwater ecosystems. Prereq: BIOL 151, BIOL 151L, BIOL 364, one year chemistry. F/2 (odd years) {Also offered for graduate credit - see ZOO 670.}.

ZOO 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: ZOO 315, ZOO 315L. F {Also offered for graduate credit - see ZOO 675.}.

ZOO 476. Wildlife Ecology and Management. 3 Credits.

Application of ecological principles to management of game and non-game wildlife populations. Prereq: BIOL 364. S {Also offered for graduate credit - see ZOO 676.}.

ZOO 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). {Also offered for graduate credit - see ZOO 677.}.

ZOO 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, BIOL 150L, BIOL 151, BIOL 151L. F/2 (even years) {Also offered for graduate credit - see ZOO 682.}.

ZOO 491. Seminar. 1-5 Credits.**ZOO 492. Study Abroad. 1-15 Credits.****ZOO 493. Undergraduate Research. 1-5 Credits.****ZOO 494. Individual Study. 1-5 Credits.****ZOO 496. Field Experience. 1-15 Credits.****ZOO 499. Special Topics. 1-5 Credits.****ZOO 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. Cross-listed with BOT 631 and PLSC 631. F {Also offered for undergraduate credit - see ZOO 431.}.

ZOO 650. Invertebrate Zoology. 4 Credits.

Survey of the biology, classification, and evolution of invertebrates. Emphasis on major phyla, marine, and parasitic taxa. S {Also offered for undergraduate credit - see ZOO 450.}.

ZOO 652. Ichthyology. 3 Credits.

Biology and taxonomy of fishes. (even years) {Also offered for undergraduate credit - see ZOO 452.}.

ZOO 654. Herpetology. 3 Credits.

Primarily a field and laboratory course focusing on amphibians and reptiles. Students must make a commitment to participate in at least one of two 4-day field trips plus an independent review project. F/2 (odd years) {Also offered for undergraduate credit - see ZOO 454.}.

ZOO 656. Ornithology. 3 Credits.

Introduction to the biology, classification, and identification of birds, especially local forms. Early morning field trips required. F {Also offered for undergraduate credit - see ZOO 456.}.

ZOO 658. Mammalogy. 3 Credits.

Biology and taxonomy of mammals. F {Also offered for undergraduate credit - see ZOO 458.}.

ZOO 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 ZOO 460.}.

ZOO 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 ZOO 462.}.

ZOO 663. Physiology of Reproduction. 3 Credits.

Comparative anatomy, physiology, and endocrinology of reproduction in mammals. Cross-listed with ANSC 663. {Also offered for undergraduate credit - see ZOO 463.}.

ZOO 663L. Physiology of Reproduction Laboratory. 1 Credit.

Anatomy, physiology and demonstration and utilization of techniques in large animal reproductive management. Cross-listed with ANSC 663L. {Also offered for undergraduate credit - see ZOO 463L.}.

ZOO 664. Endocrinology. 3 Credits.

Physiology and anatomy of endocrine glands; chemistry and interrelations of their secretions. F/2 (odd years) {Also offered for undergraduate credit - see ZOO 464.}.

ZOO 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 ZOO 465.}.

ZOO 670. Limnology. 4 Credits.

Biological, physical, and chemical features of freshwater ecosystems. F/2 (odd years) {Also offered for undergraduate credit - see ZOO 470.}.

ZOO 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. F {Also offered for undergraduate credit - see ZOO 475.}.

ZOO 676. Wildlife Ecology and Management. 3 Credits.

Application of ecological principles to management of game and non-game wildlife populations. S {Also offered for undergraduate credit - see ZOO 476.}.

ZOO 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 ZOO 477.}.

ZOO 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. F/2 (even years) {Also offered for undergraduate credit - see ZOO 482.}.

ZOO 690. Graduate Seminar. 1-3 Credits.

ZOO 695. Field Experience. 1-15 Credits.

ZOO 696. Special Topics. 1-5 Credits.

ZOO 790. Graduate Seminar. 1-3 Credits.

ZOO 791. Temporary/Trial Topics. 1-5 Credits.

ZOO 793. Indiv Study/Tutorial. 1-5 Credits.

ZOO 795. Field Experience. 1-15 Credits.

ZOO 796. Special Topics. 1-5 Credits.

ZOO 797. Master's Paper. 1-3 Credits.

ZOO 798. Master's Thesis. 1-10 Credits.

ZOO 820. Advanced Cell Biology. 3 Credits.

Study of molecular biology of plant and animal cells including molecules, molecular organization, growth and development, nuclear function, cell cycle, and cellular communication. Prereq: BIOC 702. Cross-listed with BOT 820.

ZOO 850. 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.

ZOO 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. S/2 (odd years).

ZOO 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. Cross-listed with BIOL 766.

ZOO 870. Aquatic Community Ecology. 4 Credits.

Nature and ecological roles of the freshwater biota. Discussion of contemporary issues in aquatic ecology. F/2 (even years).

ZOO 895. Field Experience. 1-15 Credits.**ZOO 899. Doctoral Dissertation. 1-15 Credits.**

Administration

- **Dean L. Bresciani, Ph.D., President**
 - Christopher S. Wilson, J.D., Chief of Staff
 - Matthew Larsen, Director of Athletics
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 - Gary Smith, Ph.D., Dean of the College of Engineering
 - Virginia L. Clark Johnson, Ph.D., Dean of the College of Human Development and Education
 - Charles D. Peterson, Pharm.D., Dean of the College of Health Professions
 - Scott Wood, Ph.D., Dean of the College of Science and Mathematics
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- **Laura McDaniel, M.S., Associate Vice President for University Relations**

Agencies

Officers of Agencies Associated with the University

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- Keith Bjerke, President and CEO, NDSU Alumni Association and Development Foundation
- Paul Kelter, Ph.D., Interim Director, Distance and Continuing Education
- Larry Kotchman, State Forester, North Dakota Forest Service
- Mark Weber, M.S., Director, Northern Crops Institute
- Chuck Hoge, Interim Executive Director, Research Technology Park, Inc.
- Kenneth Bertsch, B.S., Commissioner, State Seed Department
- Timothy Flakoll, M.S., Provost, Tri-College University
- Denver Tolliver, M.P.C., Director of Upper Great Plains Transportation Institute

State Board of Higher Education

State Board of Higher Education

Created by constitutional amendment in 1939, the State Board of Higher Education (<https://www.ndus.edu/board>) is the governing body of North Dakota State University and all other state supported institutions of higher education in North Dakota. The board's chief executive officer is the chancellor of the North Dakota University System, with offices in the state capitol in Bismarck.

- Mark Hagerott, Mandan, ND, Chancellor of the North Dakota University System
- Kathleen Neset, Tioga, ND (term expires June 30, 2017) – **Board Chair**
- Don Morton, Fargo, ND (term expires June 30, 2016) – **Vice Chair**
- Emma Tufte – **Staff Adviser**
- Brett Johnson, Grand Forks, ND (term expires June 30, 2016) – **Student Member**
- Eric Murphy, Grand Forks, ND (term expires June 30, 2015) – **Faculty Adviser**
- Nick Hacker, Bismarck, ND (term expires June 30, 2019)
- Kevin Melicher, Fargo, ND (term expires June 30, 2018)
- Mike Ness, Hazen, ND (term expires June 30, 2018)
- Kari Reichert, Bismarck, ND (term expires June 30, 2017)

- Greg Stemen, LaMoure, ND (term expires June 30, 2019)

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